



# EXPERIMENT STATION RECORD.

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# EXPERIMENT STATION RECORD.

VOL. XXVII.

ABSTRACT NUMBER.

No. 9.

## RECENT WORK IN AGRICULTURAL SCIENCE.

### AGRICULTURAL CHEMISTRY—AGROTECHNY.

On the composition of the ash of the sap, leaves, and young stems of the wild grapevine (*Vitis cordifolia*), O. M. SHEDD and J. H. KASTLE (*Jour. Amer. Chem. Soc.*, 34 (1912), No. 10, pp. 1415-1424).—After reviewing the results obtained by other investigators, the authors report analyses of a sample of sap obtained April 14 from the cut ends of a wild grapevine, and for purpose of comparison analyses of the leaves and young stems taken June 16, as follows:

Composition of the ash of the sap, leaves, and young stems of the wild grapevine (*V. cordifolia*).

Determination.	Sap (by weight).		Leaf.		Stem.	
	I. Ash of sap.	II. Fresh sap.	III. Ash of leaf.	IV. Green leaf.	V. Ash of stem.	VI. Green stem.
Water at 100°	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Crude ash	.....	99.5340	.....	75.4700	.....	79.2300
Organic matter	.....	.1130	.....	2.3300	.....	1.0200
Silica	.....	.2782	.....	22.8500	.....	20.0437
Ferric and aluminum oxides	.....	.0005	.....	.1372	.....	.0041
Calcium oxide	.....	.0006	.....	.0214	.....	.0003
Magnesium oxide	.....	.0220	.....	.7200	.....	.1114
Soda	.....	.0044	.....	.1337	.....	.0346
Potash	.....	.0017	.....	.0356	.....	.0171
Phosphorus pentoxid	.....	.0468	.....	.3427	.....	.3883
Sulphur trioxid	.....	.0058	.....	.2260	.....	.1277
Nitrogen as nitrates	.....	.0052	.....	.0634	.....	.0228
Chlorin, sap only	.....	.0075	.....	.0045	.....	.0086
		.0008				

The sap had a faintly acid taste, was slightly acid to litmus, and 2.5 cc. of decinormal sodium hydroxid solution was required to neutralize 100 cc. of the sap against phenolphthalein. Its specific gravity was 1.0035.

Composition of sweet apricot kernels, L. ROSENTHALER and W. SCHAEFFER (*Pharm. Zentralhalle*, 52 (1911), No. 19, pp. 507, 508; abs. in *Chem. Zentrbl.*, 1911, II, No. 1, p. 35; *Analyst*, 36 (1911), No. 426, pp. 450, 451).—The composition of the kernels, obtained from the south of France, was as follows: Water 4.83, total soluble matter 27.87, protein 31.4, oil 53.4, reducing sugars 8.66, reducing sugars after hydrolysis 11.64, crude fiber 4.76, and ash 2.6 per cent.



"The oil expressed from the kernels had the following physical and chemical properties: Specific gravity at 15° C., 0.9182;  $[N]_D^{25}$ , 64.7; solidifying point, 14.5°; iodine value, 95.03; saponification value, 187.76; Reichert-Meissl value, 0.96; insoluble fatty acids, 73.48 per cent. The oil was optically inactive. The fatty acids gave the following values: Solidifying point, 5.1°;  $[N]_D^{25}$ , 53.7; iodine value, 98.41; mean molecular weight, 290.55. The oil yielded negative results with Halphen's, Baudouin's, Soltsien's, and Becchi's tests, but gave a blue-violet coloration with Bellier's test, the coloration developing gradually and fading in a few minutes. The elaidin test yielded a viscous mass."

The kernels, which were edible, had a pleasant almond-like taste. They were quite different from those obtained from Japan.

Chemical-physiological examination of the tubercles on the radicles of the bean, G. SANI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5, ser., 19 (1910), II, No. 4, pp. 207-211; *abs. in Centbl. Bakt.* [etc.], 2, Abt., 30 (1911), No. 4-6, p. 75).—Among the nitrogenous substances of the bean nodules the author detected asparagin, glycocholl, and phenylalanin. The total amount of nonprotein nitrogen was 0.003 per cent. A proteolytic enzyme was also isolated.

Biochemical and toxicological studies on *Penicillium stoloniferum*, C. L. ALSBERG and O. F. BLACK (*Orig. Commun. 8. Internat. Cong. Appl. Chem.* [Washington and New York], 19 (1912), Sect. VIII, pp. 15-23).—"From cultures of *P. stoloniferum* Thom. obtained from a sample of spoiled maize from Italy, a new phenolic acid of the formula  $C_{17}H_{16}O_6$  was isolated in crystalline form. It resembles the lichen acids, is not toxic, and is one of the substances causing the ferric chlorid reaction of Gosio in deteriorated maize."

Progress made in the field of chlorophyll chemistry, E. W. MAYER (*Chem. Ztg.*, 35 (1911), Nos. 145, pp. 1341-1343; 146, pp. 1354-1356; 147, pp. 1364, 1365).—This is a review of the work done in the field of chlorophyll chemistry.

Enzymes, P. BERGELL (*Abs. in Chem. Ztg.*, 36 (1912), No. 8, pp. 68, 69).—This is a review of the present status of enzyme chemistry.

Investigations in regard to the chemical composition and formation of enzymes, III, H. EULER and S. KULLBERG (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 71 (1911), No. 1, pp. 14-30; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 4 (1911), No. 8, p. 427).—In contrast to zymase, invertase appears to be independent of the protoplasm. As the fermentation of cane sugar goes on as quickly as that of glucose and fructose it seems that the inversion process proceeds much quicker than the fermentation process. The concentration of the cane sugar solution has some influence upon both processes, irrespective of the type of yeast used in the tests. The fermentation of cane sugar goes on in the interior of the cell.

Studies on enzyme action.—II. The hydrolytic action of some amino acids and polypeptides and certain esters, K. G. FALK and J. M. NELSON (*Jour. Amer. Chem. Soc.*, 34 (1912), No. 6, pp. 828-845).—In this work, which is a continuation of the investigations previously noted (*E. S. R.*, 27, p. 712), the quantity of acid produced when methyl acetate, ethyl butyrate, and olive oil was dissolved or suspended in aqueous solutions containing glycine, alanine, phenylalanine, leucine, glycyglycine, leucylglycine, glycyllaucine, diglycyglycine, aspartic acid, and glutamic acid at 38° C. was determined.

"Glycine and alanine show the greatest amount of hydrolysis with ethyl butyrate and least with methyl acetate. Phenylalanine, on the other hand, shows a markedly greater action with methyl acetate, less with ethyl butyrate, and least with olive oil. Leucine gave practically no action with any of the three esters. Glycyglycine gave the same slight action with methyl acetate and ethyl butyrate but none with olive oil. With leucylglycine, glycyllaucine, and digly-

triglycin, maximum, though small, actions were obtained with ethyl butyrate, very slight but distinct with olive oil, while with glycyllaurin and diglycylglycin and methyl acetate negative values were obtained. Not enough measurements were made with the former to make this last result certain."

The authors point out that despite the results obtained above there is no evidence at hand that the hydrolysis of fats, etc., by lipase is due to amino acids or polypeptids.

A proteolytic enzyme in the must of overripe grapes, E. PANTANELLI (*Centbl. Bakt. [etc.]*, 2. Abt., 31 (1911), No. 23-25, pp. 545-559; *abs. in Zentbl. Biochem. u. Biophys.*, 12 (1912), No. 19-20, p. 824).—The must of overripe white and red grapes was found to contain an enzyme which cleaves protein to products which are not precipitated by copper hydroxid.

The use of elastin for detecting proteolytic enzymes, E. ABDEHOLDEN and K. KIESWETTER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 74 (1911), No. 4-5, pp. 411-426; *abs. in Chem. Abs.*, 6 (1912), No. 8, p. 1015).—Enzymes can be demonstrated in feces, various organs, and press-juices from them with the aid of elastin. A study made of the digestion of elastin and of native and coagulated egg albumin by gastric juice and pepsin-hydrochloric acid with the aid of the optical method indicated that the results obtained with gastric juice and pepsin-hydrochloric acid are not at all comparable.

The ferment nature of peroxidase, GRIMMER (*Milchz. Zentbl.*, 41 (1912), No. 6, pp. 165-168).—Milk peroxidase apparently has nothing to do with the alkalinity or the inorganic constituents of milk. Peroxidase is of an organic nature and closely associated with lactalbumin.

Activation of sucrase by various acids, G. BERTRAND and M. and MME. M. ROSENBLATT (*Compt. Rend. Acad. Sci. [Paris]*, 153 (1911), No. 26, pp. 1515-1518; *abs. in Zentbl. Biochem. u. Biophys.*, 13 (1912), No. 4, p. 167).—The action of a large number of acids and acid salts was studied as regards their power of accelerating the activity of sucrase (invertase), and with particular reference to the optimum concentration of these acids.

The chemical constitution of the proteins, R. H. A. PLIMMER (*New York, Bombay, and Calcutta*, 1912, 2. ed., pt. 1 pp. XII+188, figs. 6).—In this second edition (E. S. R., 21, p. 210) a more detailed analysis of the proteins is given.

The precipitation of proteins by zinc sulphate, F. LIPPICH (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 74 (1911), No. 4-5, pp. 360-391; *abs. in Chem. Abs.*, 6 (1912), No. 8, p. 1010).—"When protein is precipitated by increasing concentrations of zinc sulphate, there are 2 maxima of precipitation, the first beginning at 0.08 to 0.1 normal, the second at 1.8 to 2 normal; between lies a minimum at which the liquid remains for a time clear. Equal volumes (5 to 10 cc.) of diluted horse serum were treated with graduated amounts (0.1 to 1 cc.) of a saturated solution of zinc sulphate, and made up to a round volume (50 to 200 cc.). The conditions corresponded to rapid equilibrium at the lower maximum. The precipitates contained, independently of the concentration of protein and the original concentration of zinc sulphate, always the same amount of zinc. The capacity of the protein to combine with zinc apparently increases with the dilution; that the zinc precipitated per unit volume remains the same seems to indicate a combination in constant proportions. The precipitations produced at the second maximum contain about twice as much zinc. The results are difficult to reconcile with the absorption hypothesis. They suggest rather a balanced reaction according to the scheme:  $\text{ZnSO}_4 + 2\text{Na protein} \rightleftharpoons \text{Na}_2\text{SO}_4 + \text{Zn(protein)}_2$ . Most of the facts can be explained by the further assumption that, as salt concentration and other conditions vary, there arise such types of compound as  $\text{ZnSO}_4$ , protein;  $\text{Zn}$ , protein,  $-\text{ZnSO}_4$ ; and  $\text{Zn}$ , protein."

**Dilatometric investigation in regard to the precipitation of proteins.** G. GALEOTTI (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 78 (1912), No. 6, pp. 421-424, fig. 1).—No variation in volume takes place during the coagulation of proteins by either enzymes or heat. During the precipitation of egg albumin with the so-called precipitating reagents an increase in volume takes place, which is dependent upon and differs with the precipitating reagent employed. It is greatest with ammonium sulphate, less with the salts of heavy metals, and least with potassium ferrocyanid, phosphotungstic acid, and tannic acid.

**The progressive hydrolysis of fats.** A. GRÜN and O. CORELLI (*Ztschr. Angew. Chem.*, 25 (1912), No. 14, pp. 665-670; abs. in *Jour. Soc. Chem. Indus.*, 31 (1912), No. 9, p. 442).—When pure tripalmitin was treated for several hours with sulphuric acid of 86° B. at 70° C. in the proportion of 10 molecules of acid to 1 of glycerid, a fatty acidity equal to 56.5 per cent was obtained. This shows that a diglycerid is produced from a triglycerid without the production of mono-glycerid. Similar results were obtained when tristearin was treated in the same way. Attempts to isolate intermediary products failed.

**The hydrolysis and constitution of lecithin.** F. MALENGREAU and G. PRIGENT (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 77 (1912), No. 2, pp. 107-120).—The authors found that it was possible with the aid of heat to hydrolyze lecithin completely with either a decinormal sulphuric acid solution or a decinormal hydrochloric acid solution. The process takes about 5 or 6 hours, but has the advantage of not leaving an excess of acid present at the end of the process. Cholin does not influence the reaction.

**Note on hydrolysis of vegetable oils by emulsion of *Ricinus communis*.** D. SOMMERVILLE (*Bio-Chem. Jour.*, 6 (1912), No. 2, pp. 253, 254).—No difference was noted in the amount of hydrolysis with castor oil or cotton-seed oil when treated with an emulsion of the castor bean, therefore it is concluded that the enzym of the castor bean does not act specifically toward its own oil. The author was not able to note any acceleration of hydrolysis by acetic acid and manganese sulphate. The lipase of the castor bean was not refractory to heat when protected by oil. Heating the emulsion to 60° C. destroyed the enzym. The bean from which the emulsion was obtained was stable when heated at 100° for 24 hours.

"Cotton oil and castor oil, when carefully neutralized and freed from proteins fail to undergo hydrolysis. If to this oil an enzymic emulsion, in which hydrolysis of fat has not yet commenced, be added, nothing results. If hydrolysis is established in the emulsion, the hydrolysis proceeds in the added oil, irrespective of whether this oil be neutral or contain within wide limits (25 per cent) free fatty acids."

**The hydrolysis of saccharose by various acids in the presence of invertase.** C. BÉTRAND, M. and MME. M. ROSENBLATT (*Bul. Soc. Chim. France*, 4. ser., 11 (1912), No. 4, pp. 176-186; abs. in *Jour. Soc. Chem. Indus.*, 31 (1912), No. 6, p. 294; *Ztschr. Angew. Chem.*, 25 (1912), No. 21, p. 1083).—It is concluded that with invertase and perhaps with other soluble ferments we must assume that in the presence of specific colloidal substances the activity of the acid does not depend entirely upon the hydrogen ion which results from the electrolytic dissociation, but is also greatly dependent upon the nature of the radicals or anions to which the hydrogen in the acid molecule is bound.

**An unrecognized source of error in the Kjeldahl-Gunning method for the determination of nitrogen.** P. A. W. SELF (*Pharm. Jour. [London]*, 4. ser., 34 (1912), No. 2527, pp. 384, 385).—The author sought to ascertain the cause for the low results which were often obtained with the Kjeldahl-Gunning method when comparatively large amounts of material were employed. The results of:

the investigation show that where 25 cc. of sulphuric acid is used in the method 15 gm. of sulphuric acid should remain behind.

The amount of material to be taken for each determination is  $3\frac{1}{2}$  gm. for cereals or a material containing much carbohydrate, while the limit for fat-containing material should vary from 3 gm. for a sample containing from 5 to 10 per cent of fat and 1.5 gm. for material containing from 80 to 90 per cent. The amount of acid should be proportionately increased when small amounts of nitrogen are present.

Determination of total potassium in minerals, C. J. SCHOLLENBERGER (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 6, pp. 436, 437, fig. 1).—When potassium alone is to be determined the J. L. Smith method is long and tedious and the modifications thereof leave much to be desired. The following method has been used with success in the laboratory of the Ohio Station:

Proceed as in the regular Smith method for total alkalis until the filtrate from washing out the alkalis from the fusion is obtained. To this add a moderate excess of hydrochloric acid and evaporate to dryness on a steam bath, remote from ammonia fumes. Take up with about 2 cc. of concentrated hydrochloric acid and 25 cc. of hot water, and filter through [an Ames] suction filter into a 150 cc. beaker, washing the large beaker and filter well. Add the proper amount of hydrochloroplatinic acid solution, and evaporate on steam bath until of a semisolid consistency. The large amount of calcium chlorid present crystallizes out on cooling, but is readily soluble in acidulated alcohol. The crystalline precipitate of the potassium chloroplatinate is washed with acidulated alcohol, Gladding wash, and 80 per cent alcohol, on a filter designed especially for this work. After drying to remove alcohol, the precipitate is dissolved in hot water, the solution being received in a tared platinum dish, and after evaporation, dried and weighed."

The Ames filter, which possesses several advantages over the Gooch crucible filter for collecting and washing the potassium platinic chlorid, is described and illustrated.

Carbon dioxide: Its volumetric determination, L. T. BOWSER (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 3, pp. 203-205, figs. 2).—This is a modification of the Mims method, and consists essentially of releasing the carbon dioxide from the substance under examination by means of hydrochloric acid, absorbing it in a strong alkaline solution, and measuring the absorbed gas by titration with a standard acid solution with the aid of a suitable apparatus. The apparatus is depicted, and consists of an Erlenmeyer flask holding a small separatory funnel, a short Liebig condenser having an inner tube of very small bore, and an absorbing tower. The absorbing tower consists of a glass tube containing some glass beads for the purpose of dividing the carbon dioxide, and 10 cc. of potassium hydroxid solution (50 gm. of potassium hydroxid in 100 cc. of solution) for absorbing the carbon dioxide.

On the determination of carbon dioxide in soils, L. T. BOWSER (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 4, pp. 265, 266).—The method described above is considered especially adaptable to soils containing small amounts of carbon dioxide, giving more consistent results than the method generally employed.

Determination of sulphuric acid in the soil, P. DE SORNAV (*Internat. Sugar Jour.*, 13 (1911), No. 153, pp. 497-500; *abs. in Zentbl. Biochem. u. Biophys.*, 13 (1912), No. 4, p. 132).—The usual method for determining sulphuric acid in soils is deemed inexact, especially if much aluminum and iron are present. The following method is recommended for this purpose:

Ten gm. of the soil is mixed with 1 gm. of potassium nitrate and 5 cc. of water, dried on the sand bath, calcined, and treated with 25 cc. of hydrochloric

acid. The heating is continued until the mass is absolutely dry and the silicic acid is rendered insoluble. Fifty-five cc. of water and 20 cc. of hydrochloric acid are then added and the whole is heated for from 30 to 45 minutes on a sand bath, being careful not to go to the point of dryness. After filtering, the residue on the filter is washed with from 100 to 125 cc. of water. To the filtrate and washings barium chlorid is added, heated, concentrated slightly, and the remainder of the procedure conducted in the usual manner.

Report of committee of the fertilizer division of the American Chemical Society, F. B. CARPENTER ET AL. (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 3, pp. 223-225).—This is a report of the committee on fertilizer legislation (potash, phosphate rock, and nitrogen), presented at the forty-fifth meeting of the American Chemical Society, held at Washington, D. C., in December, 1911.

Methods of organic analysis, H. C. SHERMAN (*New York, 1912, 2. ed., rev. and enl.*, pp. XVI+407, figs. 18).—This publication (*E. S. R.*, 17, p. 732) has been rewritten and enlarged to include a chapter on solid and liquid fuels, and sections on industrial alcohol, drying oils, crude petroleum, new international methods of glycerin analysis, and quantitative methods for assaying enzymes. The discussions on aldehydes, sugars, proteins, and food preservatives have been somewhat extended.

Allen's commercial organic analysis, edited by W. A. DAVIS and S. S. SADTLER (*Philadelphia, 1912, 4. ed., rev., vol. 6, pp. IX+726, pls. 2, figs. 6*).—This volume has been entirely rewritten. Among its contents are methods of analysis of amines and ammonium bases, aniline and its allies, naphthylamines, pyridine, quinoline and acridine bases, vegetable alkaloids, volatile bases of vegetable origin, nicotine and tobacco, aconite alkaloids, atropine and its allies, cocaine, opium, strychnine alkaloids, cinchona alkaloids, berberine, caffeine, tea and coffee, and cocoa and chocolate. The properties of the above substances are also discussed.

A modified Wiley extraction apparatus, W. D. RICHARDSON and E. F. SCHERUBEL (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 5, pp. 220, 221).—The Wiley apparatus has been modified into three forms so that it may be used for the extraction of tankage, cotton-seed meats and meals, meat and sausages, soap, etc.

New reactions for salicylic acid, E. BARRAL (*Bul. Soc. Chim. France*, 4 ser., 11 (1912), No. 8, pp. 417-420).—A description of 4 new reactions.

In regard to the macroscopic and microscopic detection of carotin, M. TSWETT (*Ber. Deut. Bot. Gesell.*, 29 (1911), No. 2, pp. 630-636; *abs. in Zentr. Biochem. u. Biophys.*, 12 (1912), No. 19-20, p. 778).—Mollisch's potassium and Tswett's resorcin methods are not specific reactions for detecting carotin microscopically, and they indicate only lipochromes, that is, carotin groups, which in the end means very little. Doubt also exists as to whether the red crystals obtained with the Frank and Tschirch acid method are in reality composed entirely of carotin. In all events, it will be necessary to investigate the work of those whose results were obtained with these methods, in regard to the distribution of carotin in the vegetable kingdom. It is believed that macroscopic methods will have to be used in future investigations.

The detection of adulterations by colloidal chemical methods, E. MARRIAGE (*Ztschr. Chem. u. Indus. Kolloide*, 11 (1912), No. 1, pp. 1-5, figs. 8).—As many of the fruit juices and other materials used in the manufacture of jellies and marmalades are first passed through filter presses, the materials entering into their composition can be detected only with difficulty by the usual microscopic methods. With the thought in mind that colloidal chemical methods might be effective for this purpose experiments were conducted with the following mixtures: (1) Agar (1 per cent), gel 46 gm., cane sugar 10 gm.;

(2) agar (1 per cent), gel 50 gm., cane sugar 20 gm.; (3) apple jelly; (4) apple jelly 8 parts, agar gel (agar 2½, sugar 50, water 47½ per cent) 2 parts; (5) apple jelly 6 parts, agar gel with sugar 4 parts; (6) gooseberry jelly; (7) apples 53 parts, and gooseberries 12 parts; (8) starch; (9) gelatine; (10) orange marmalade; and (11) currant jelly. The reagents used were potassium iodid and a cold saturated solution of lead nitrate. About 5 per cent of potassium iodid was added to the heated jelly, followed on cooling by the lead nitrate solution.

The lead iodid precipitate produced was found to vary in structure with the material tested. Its structural characteristics can best be studied with the microscope, although the differences can be noted macroscopically. Sugar when present seemed to influence considerably the size of the lead iodid granules produced. Emphasis is placed on the fact that much work will have to be done in this direction and that the experimental data should be accompanied by photographs for the purpose of determining the utility of the method for food inspection work.

A method for the determination of starch in food products, T. M. PRICE (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 203, pp. 6*).—This is a combination of the desirable features present in the Perrier and the Bigelow-Mayrhofer methods, and the elimination of the objectionable features contained in them. The method is as follows:

"In a 200 cc. beaker treat 10 gm. of finely divided meat with 75 cc. of an 8 per cent solution of potassium hydrate in 95 per cent alcohol, and heat on the steam bath until all the meat is dissolved. This will require from 30 to 45 minutes. Add an equal volume of 95 per cent alcohol, cool, and allow to stand at least 1 hour. Filter by suction through a thin layer of asbestos in a Gooch crucible. Wash twice with warm 4 per cent potassium hydrate in 50 per cent alcohol and then twice with warm 50 per cent alcohol. Discard the wash water. Endeavor to retain as much of the precipitate in the beaker as possible until the last washing. Place the crucible with contents in the original beaker, add 40 cc. of water and then 25 cc. of concentrated sulphuric acid. Stir during the addition of the acid and see that the acid comes in contact with all the precipitate. Allow to stand about 5 minutes, add 40 cc. of water, and heat just to boiling, stirring constantly. Transfer the solution to a 500 cc. graduated flask, add 2 cc. of a 20 per cent aqueous solution of phosphotungstic acid, allow to cool to room temperature, and make up to mark with distilled water. Filter through a starch-free filter paper, and determine the dextrose present in a 50 cc. portion of the filtrate with Fehling's solution after neutralizing the acid, using Low's method . . . for the determination of the copper in cuprous oxid precipitate. The amount of dextrose multiplied by 0.9 gives the equivalent in starch.

"The accuracy of the above-described method was demonstrated through its application to a number of samples of sausages to which known amounts of pure cornstarch had been added."

Determination of nucleic acid in the flesh of mammalia, A. SCALA (*Ann. g. Socr., n. ser., 20 (1910), No. 4, pp. 509-520; abs. in Zentbl. Biochem. u. Biophys., 13 (1912), No. 1-2, p. 9*).—The method rests upon the principle that when nucleic acids are treated with barium chlorid a precipitant of barium nucleate is obtained.

Composition of dry gluten and its relation to the protein content of flour, G. A. OLSON (*Jour. Indus. and Engin. Chem., 4 (1912), No. 3, pp. 206-209*).—Believing that perhaps the reason for high-protein flours containing relatively more gluten than flours which are low in protein was due to a larger content of impurities, the author made tests with gluten from flours representing

wheats of the Bluestem, Red Russian, Turkey Red, Fife, Dale, Little Club, Galgalos varieties, and of hybrids cultivated at the Washington Station.

Summarizing results it would seem that "gluten as it is ordinarily prepared has a variable nitrogen, ash, starch, and moisture content. The peculiar copper reduction resulting from adding the filtered extract from hydrolized gluten by acid is undoubtedly due to some other substance than starch or sugar. An average of about 75 per cent of the total nitrogen of flour enters into the crude gluten. Glutens obtained from low-protein flours are not necessarily any richer in nitrogen, more free from ash, etc., than glutens derived from medium- or high-protein flours. The reason why low-protein flours yield much lower percentages of gluten than medium- or high-protein flours may be attributed to the scattering of such glutens, resulting in mechanical loss. Blending such flours with strong gluten flours results in yields comparable to those obtained for medium- and high-protein flours."

Contribution to the examination of flour, E. KOHN (*Chem. Ztg.*, 36 (1912), No. 14, pp. 121-123).—For detecting foreign substances in flour, i. e., by-products, the author utilized the following method:

One-half gm. of flour is well shaken with 10 cc. of ether in a test tube and poured in a comparatively flat, large, porcelain dish. Bran, plant hairs, and wheat particles are removed from the surface of the liquid upon which they float or the ether is allowed to evaporate and the particles removed from the residue by means of a preparation needle. The particles are then washed with a little water to remove the adhering starch grains and examined in chloral hydrate. An optional qualitative method is also given.

To detect wheat, bean, or barley flour in rye flour, the author allows diastase to act on flours in an acid medium and then determines the density or the sugar content of the hydrolized mixture. The figures obtained are greatest for rye flour, least for bean flour, and greater for wheat flour than barley flour.

The Watkins test for determining the cause of sliminess in bread, H. KÜHL (*Chem. Ztg.*, 35 (1911), No. 143, pp. 1321, 1322).—There are two methods which may be used for detecting the presence of the organisms which produce sliminess in bread, namely, the baking test in which 450 gm. flour and 240 cc. of water at from 40 to 42° C. are employed, and the Watkins test,<sup>4</sup> which is based on the fact that the bacteria producing the viscousness contain spores which resist temperatures varying between 80 and 100°, whereas spore-free bacteria are thermolabile. The latter method is of particular value where only small quantities of flour are available for the test, and it can also be employed for obtaining pure cultures of slime-producing bacteria. Some experiments with the method are reported.

The chemical differentiation of fermentation vinegar and vinegar essence, with particular reference to their formic acid content, H. FINCKE (*Deut. Essigindus.*, 15 (1911), No. 19, pp. 145-148).—This is a discussion of work previously noted (*E. S. R.*, 25, p. 311; 26, p. 208).

Standards for malt vinegar, A. C. CHAPMAN (*Pharm. Jour. [London]*, 4, ser., 34 (1912), No. 2527, p. 394).—The author maintains that malt vinegar complying with the requirements set down by the U. S. Department of Agriculture as regards methods of manufacture may give analytical results well outside of the standards laid down.

"Thus, it is shown that in cases where fermentation has been very completely effected the malt vinegar may have a levorotatory instead of a dextrorotatory action on polarized light, owing to the disappearance of the dextrorotatory carbohydrate matters, and to the presence of levorotatory proteins.

<sup>4</sup> *Jour. Soc. Chem. Indus.*, 25 (1906), No. 8, pp. 350-357.

It is also pointed out that in the case of malt vinegar made with hard water the proportion of soluble phosphate acid may fall much below the limit laid down in the Department's regulations."

**Determining the shell or hull content of cocoa by A. Goske's method.** F. SCHMIDT and J. GÖBBING (*Ztschr. Öffentl. Chem.*, 18 (1912), No. 11, pp. 201-214).—This is a study of the Goske method (E. S. R., 23, p. 12), which indicates that the method is unsatisfactory, especially where the cacao products have been previously prepared and ground finely. The shell content of prepared cocoa, containing from 25 to 50 per cent of shells, can not be determined with any degree of accuracy.

**In regard to the detection of adulterations in paprika.** A. VON SIGMOND and M. VUK (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 8, pp. 387, 388).—Previously noted from another source (E. S. R., 27, p. 715).

**Artificial coloration of foods and condiments.** E. SPAETH (*Pharm. Zentralblatt*, 52 (1911), Nos. 10, pp. 243-251; 11, pp. 282-291; 12, pp. 310-316; 13, pp. 336-343; 14, pp. 368-374; 15, pp. 400-403; 17, pp. 459-467; 31, pp. 813-818; 32, pp. 839-843; 33, pp. 866-868; 34, pp. 893-897; 35, pp. 919-924; 36, pp. 948-953; 37, pp. 967-971; 38, pp. 998-1004; 40, pp. 1062-1067).—This is a continuation of the work previously noted (E. S. R., 25, p. 712), and deals with the artificial coloring of conserved vegetables, crab butter (crab extract and crab powder), anchovies, caviar, egg conserves, tea, coffee, and chocolate.

**Some observations on the modified LaWall method for the determination of sodium benzoate in catsups.** W. D. MCABEE (*Ann. Rpt. Ind. Bd. Health*, 29 (1910), pp. 323, 324).—These studies were made with catsups which were first tested as to their freedom from benzoic acid, and known amounts of the acid then added. The method as modified by La Wall and Bradshaw (E. S. R., 20, p. 211) was found to be very accurate. Fifty gm. of catsup was used instead of 200.

**Methods for determining the fat in milk.** O. RAMMSTEDT (*Ztschr. Angew. Chem.*, 25 (1912), No. 16, pp. 754-758).—The neu-sal method, when conducted with the acid butyrometric apparatus, was found to yield values which are comparable with those obtained by the Gerber acid butyrometric test and the Röse-Gottlieb method. The sal method on the other hand yields higher results. For heated milk the neu-sal method is thought to yield correct results, although this is contrary to the finding of other authors. The author advises, however, that the coloring matter used in the reagent should be eliminated. No acid reaction toward litmus was noted in the reagent.

Other comparative tests carried out indicate that with whole milk the Gerber acid butyrometric, the Gerber neu-sal, and the sand method (with 2 extractions of 6 hours each) yield comparable results. The Funke method yielded results which were slightly higher. The Adams, Röse-Gottlieb and usual sand methods, while comparable among themselves, gave lower results than the fore-mentioned. With top milk the following figures were obtained: "Neu-sal" and Funke 6.6 per cent, Röse-Gottlieb 6.34 per cent, Adams 6.33 per cent, acid butyrometric 6.4 per cent, sand (single extraction) 6.28 per cent, and sand (double extraction) 6.49 per cent.

**Detection of watered milk by Cornalba's method.** F. BORDAS and F. TOUTAIN (*Ann. Falsif.*, 5 (1912), No. 42, pp. 171-173).—The figures for total soluble solids in the serum from 100 cc. of milk were somewhat lower than those reported by other authors, varying from 5.163 to 5.94, with an average of 5.49. These differences are probably due to the use of different reagents for preparing the serum and this must be taken into account when adopting the method as a standard.



A portable outfit for the determination of visible dirt in milk, F. O. TORNEY (*Amer. Jour. Pub. Health*, 2 (1912), No. 4, pp. 280, 281, figs. 2).—This apparatus consists of a Gooch crucible filter attached to a Chapman filter pump which has a rubber collar for fitting over an ordinary faucet. The filtering material consists of a very thin disk of absorbent cotton.

Comparative investigations of the bacteriological and biochemical methods for judging milk, O. SCHROETER (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, pp. 181-192).—Of the 122 samples of milk utilized in this work, 89 samples consisted of ordinary market milk, 28 samples of a special milk in the original bottles, 3 samples of milk drawn in the barn of the, agricultural institute of the University of Leipsic, one skim milk, and one milk purposely mixed with the milk obtained from cows suffering with mastitis. The following observations were made: (1) The total germ content on meat extract, whey, Heyden-, and Ragit-agar, after 3 days at 38° C.; (2) the number of lactic-acid bacteria (according to Beijerinck) upon calcium carbonate-whey-agar plates; (3) the number of coli bacteria (according to Harrison and Vanderleek) in esculin bouillon; (4) the amount and character of the sediment obtained in the leucocyte test (Trommsdorff); (5) the microscopic picture of the centrifuge residue; (6) the results obtained with the catalase test with 15 cc. of milk plus 5 cc. of 1 per cent hydrogen peroxid at 20° C., with a special form of apparatus, which is described; (7) the reductase test (O. Jensen); (8) the milk fermentation test at 38°; (9) the degree of acidity (Soxhlet-Henkel); and (10) the alcohol and boiling test.

The catalase and reductase tests for the examination of milk, G. GUDENUS (*Handel. Vlaamsch Natuur en Geneesk. Cong.*, 15 (1911), pp. 108-111).—A description of the procedures and apparatus used for the catalase and reductase tests. The interpretation of the results is also considered.

The Schardinger reaction of cow's milk, P. H. RÖMER (*Biochem. Ztschr.*, 50 (1912), No. 1-2, pp. 5-14).—This is a reply to Rullmann (E. S. R., 25, p. 755), supported by experimental data to show that the initial milk almost always gives a negative Schardinger test. Commercial milk samples taken at Marburg, Germany, were often found to yield negative results. The reaction will not, therefore, indicate whether a given sample of milk has been heated or not.

The effect of cooling milk upon the outcome of the Schardinger reaction, R. BURRI and H. SCHMID (*Biochem. Ztschr.*, 36 (1911), No. 5-6, pp. 376-388, figs. 4).—The formaldehyde-methylene blue reduction reaction is somewhat dependent upon the temperature to which the milk was previously subjected. Cooling reduces the time of reduction, which probably means an increase in the enzym content. The solidification of the milk fat globules in this connection is also considered.

The behavior of sterile and boiled milk with rennet and acid, A. KREIDT and E. LENK (*Biochem. Ztschr.*, 36 (1911), No. 5-6, pp. 357-362).—Boiled, as well as sterile milk, can be coagulated with rennet. Sterile vessels for holding the milk, or sterile rennet, are not necessary, and in fact, sterile milk with an acidity not over 22 cc. of tenth-normal acid when treated with sterile rennet in a sterile vessel will not coagulate, though touching the milk so kept with an unsterile finger, or the addition of a few drops of ordinary milk, will bring about coagulation. The lactic-acid bacillus multiplies best in a slightly acidified milk (from 0.2 to 0.6 cc. of tenth-normal acid to 10 cc. of milk). The addition of an acid to a sterile milk contained in a sterile vessel, to the extent of 2 cc. tenth-normal hydrochloric acid to 10 cc. of milk, produces no precipitation even after acidification at blood heat.

The reaction of rennet on milk, M. NIRENSTEIN and JESSIE STUBBS (*Jour. Agr. Sci.*, 4 (1912), No. 4, pp. 371-375).—The conclusions drawn in this work

were as follows: (1) The acidity of milk is not due entirely to the formation of lactic acid, but partly to some product produced from caseinogen. (2) Pure lactic acid cannot be used as a starter in Cheddar cheese making, though it stimulates the production of acid from caseinogen. (3) The retardation of the time of coagulation with rennet is not entirely dependent on the calcium salts.

Investigations in regard to the hemolytic action of cow's colostrum, W. KÖNIG (Compt. Rend. [etc.], 1. Abt., Orig., 61 (1912), No. 7, pp. 561-589; *abs.* in Compt. Rend. [etc.], 1. Abt., Ref., 52 (1912), No. 21, p. 653).—The colostrum of some cows contains amboceptor and complement, the former being extinct 2 days post-partum. Both of these are present in the initial and end milk in about the same quantity. They originate from the blood serum which gains access to the milk during the colostrum period.

In regard to milk hemolysis, B. SCHMIDT (Arch. Kinderheilk., 56 (1911), No. 4-6, pp. 342-353; *abs.* in Berlin. Tierärztl. Wchnschr., 28 (1912), No. 27, p. 501).—The hemolytic method advocated by Bauer and Sassenhagen (E. S. R., 22, pp. 114, 513) for detecting colostrum and mastitic milk was found satisfactory. Instead of using guinea-pig blood rabbit blood can be employed. When bovine serum is used it must be previously titrated.

Viscosimetric studies on human milk, K. BASCH (Wiener Klin. Wchnschr., 24 (1911), No. 46, pp. 1592-1595; *abs.* in Chem. Abs., 6 (1912), No. 5, p. 645).—The viscosity was diminished as the period of lactation went on, until it reached a constant value.

A small contribution from dairy laboratory practice, M. SIEGFELD (Molk. Ztg. [Hildesheim], 26 (1912), Nos. 34, pp. 617, 618; 35, pp. 631-633).—This is a discussion in regard to Storch's reaction, the determination of fat according to the Gottlieb method, the determination of fat in cream, the composition of various proprietary preservatives for milk and milk products and other preparations, determinations of iron in curd which indicate that the Schaeffer test (E. S. R., 22, p. 212) is unreliable and the potassium sulphocyanid test is more satisfactory, the detection of iron in dairy salt, and other data. In some of the tests mentioned improvements and substitutions are suggested.

Detection of iron in cheese curd, H. SCHERER (Molk. Ztg. [Hildesheim], 26 (1912), No. 40, pp. 738, 739).—The author maintains that aside from the fact that the results when obtained on the bases of Schaeffer's color table only refer to 20 gm. of curd instead of 100 gm. of curd, the method is practical and exact and can be used without any difficulty by the practical dairyman. Siegfeld's contentions (see above) are therefore not considered to be entirely borne out.

Detection of iron in cheese curd, M. SIEGFELD (Molk. Ztg. [Hildesheim], 26 (1912), No. 45, p. 838).—In reply to Scherer (see above), the author points out that iron is not present in a soluble form nor is it evenly distributed in the cheese curd. The reason that Scherer obtained a stronger reaction with ammonium sulphid than with potassium sulphocyanid was probably because of the uneven distribution of the iron in the cheese samples which he examined.

Determination of moisture and fat in cheese, H. LÜHRIG and E. NOCKMANN (Molk. Ztg. [Hildesheim], 26 (1912), No. 37, pp. 669-671).—Some comparative tests were made with two methods, (a) and (b), for determining the moisture content of cheese. In method (a) from 3 to 5 gm. of the cheese mass, mixed with ignited sand or pumice stone in a platinum dish, is dried in a vacuum desiccator for a few days and then for 8 hours in a steam bath at from 97 to 100° C. Method (b) utilizes the same amount of cheese, evenly distributed in a platinum dish and heated first on a water bath and then finished in a glycerin water bath at from 102 to 105° for from 4 to 6 hours.

Both methods yield practically the same result, but (a) is recommended because it is more conveniently conducted. The Bondznaki-Ratzloff method is recommended for determining the fat in cheese.

**Method for determining salt and fat,** R. H. SHAW (*Cream. Jour.*, 23 (1912), No. 10, pp. 12, 13, 16, fig. 1).—Previously noted (E. S. R., 27, p. 614).

**The adulteration of butter,** A. ELOIRE (*Hyg. Viande et Lait*, 5 (1911), No. 12, pp. 681-697; 6 (1912), No. 1, pp. 12-33).—This is a review of existing methods for detecting abnormal butter and adulteration in butter. The results of examining different kinds of butter are also included.

**Methods of detecting adulterations in butter,** L. ROBIN (*Ann. Patisf.*, 5 (1912), No. 42, pp. 180-187).—This is a simplification of the methods previously noted (E. S. R., 18, p. 709). It describes the preparation of the reagents and the procedure for determining fatty acids soluble in alcohol, the fatty acids soluble in water, and the fatty acids insoluble in water but soluble in alcohol, with the interpretation of the results obtained.

**Determination of fat in feed stuffs and seeds,** M. MONHAUPT (*Chem. Ztg.*, 35 (1911), No. 141, p. 1305).—A formula is given for calculating the fat content of certain substances when determining the fat by the shaking-out method. An aliquot of the ethyl ether or petroleum ether extracts is taken for the determinations. The formula can also be employed in all cases where a soluble constituent of known specific gravity is shaken out with a definite amount of appropriate solvent from the substance under examination.

**A method for differentiating sterilized from unsterilized bone meal,** R. POLENSKE (*Arb. K. Gsndhtsamt.*, 38 (1912), No. 4, pp. 559-561).—As ground bones are often used for feeding stock, including poultry, and may have originated from diseased animals, the author recommends the following method for determining whether or not the bone has been sterilized.

Ten gm. of the meal is mixed with 30 cc. of cold water and allowed to stand for 24 hours, shaking occasionally during this time. The mixture is then filtered and the filtrate poured back upon the filter until a clear fluid is obtained. To 10 cc. of the filtrate is added 2 drops of concentrated acetic acid, the mixture brought to the boiling point, and the tube with its contents placed in a water bath held at 95° C. for  $\frac{1}{2}$  hour. If a flocculent deposit is produced the material was not sterilized previously.

**In regard to the behavior of invert sugar in an alkaline solution and in the presence of hydrogen peroxid,** A. JOLLES (*Biochem. Ztschr.*, 36 (1911), No. 5-6, pp. 389-393).—This is a continuation of the work previously noted (E. S. R., 26, p. 307).

**Comparison between the double polarization method of determining sucrose and the direct polarization after destruction of the reducing sugars,** H. PELLET (*Internat. Sugar Jour.*, 14 (1912), No. 159, pp. 161, 162; *ibid.* in *Jour. Soc. Chem. Indus.*, 31 (1912), No. 7, p. 351).—"A number of comparative determinations with the Pellet-Lemeland and other methods of determining sucrose have been carried out, the following results being obtained: Direct polarizations, defecating with basic lead acetate, 33.7; direct polarization, using hypochlorite and normal lead acetate for clarification, 28.9; direct acid polarization, using hydrochloric acid and urea (Andrlik), 30.9; sucrose by double polarization, using the neutral direct polarization, and verified constants, 38.9; sucrose by double polarization, employing the acid (Andrlik) direct polarization, and verified constants, 38.6; direct polarization, after destruction of the reducing sugars, by the Pellet-Lemeland procedure, 38.8; sucrose by double polarization, using the solution in which the reducing sugars had been destroyed by the Pellet-Lemeland process, 38.5; sucrose by determining the reducing sugars before and after inversion, and operating directly on the

sample, 38.3. Six other samples were also examined by the double polarization method and the results compared with those found by direct polarization after the destruction of the reducing sugars by the Pellet-Lemeland method, the following being the figures obtained: By the double polarization method, using for the direct reading the solution clarified with hypochlorite and defecated with normal lead acetate: (1) 45.3; (2) 39.4; (3) 39.7; (4) 35.9; (5) 40.2; and (6) 37.5; and by direct polarizations, after destruction of the reducing sugars: (1) 46.3; (2) 39.4; (3) 37.5; (4) 35.5; (5) 39.0; and (6) 38.4."

**Gravimetric determination of saccharose by oxidation with chromic acid.** A. WECHSLER (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 40 (1912), No. 5, pp. 688-708, figs. 1).—Saccharose when present alone is oxidized in a special form of apparatus, which the author calls an "oxydimeter," with a mixture consisting of 500 cc. of commercial sulphuric acid, 300 cc. of water, and 100 gm. of chromic acid. Fifty cc. of this mixture is added to an amount of saccharin substance which will contain on an average from 0.15 to 0.25 gm. of carbon to be oxidized. Inorganic substances when present have no influence upon the oxidizing process. The results obtained by the method for refined sugar and beet extracts agreed well with the polarimetric findings. Basic lead nitrate was used as the precipitating and clearing agent for the beet pulp. A new method for determining the ratio of saccharose to nonsugar during the process of manufacture, on the basis of the oxidizing and polarimetric test, is also included.

**The inversion of saccharose by bees' honey.** O. ACHERT (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 4, pp. 136-139).—A honey-saccharose mixture in which the honey was never heated to over 55° C. showed an inversion of the saccharose to the extent of reducing it from 22.05 to 2.21 per cent in a period of 4 months. Heating to 100° destroyed the inverting enzyme, as found by Moreau (*E. S. R.*, 26, p. 312). Acids like formic play no part in the inversion process, as neutralized samples were found to be inverted much more quickly and to a greater extent than those containing free acid.

**Incrusting coloring matter of sugar cane.** L. C. LANGGUTH-STEINERWALD (*Arch. Suikerindus. Nederland. Indië*, 19 (1911), No. 47, pp. 1543-1557; *Meded. Proefstat. Java-Suikerindus.*, 1911, pp. 365-379, pl. 1; *abs. in Deut. Zuckerindus.*, 37 (1912), No. 1, pp. 5, 6; *Chem. Ztg.*, 34 (1912), No. 12, *Repert.*, p. 55).—In the cane, and apparently also in the cane juice, a new coloring substance, which is termed saccharetin, was noted. The purified substance corresponded to the formula  $(C_6H_7O_2)_n$ , has the characteristics of a phlobaphene, is light yellow in color, optically inactive, slightly acid, and is soluble only in alcohol, glacial acetic acid, and alkalis.

**The Andriks method of polarization as applied to cane products.** H. PELLER (*Internat. Sugar Jour.*, 14 (1912), No. 157, pp. 28-30).—If a sufficient amount of lead salts is added to pure sugar solutions about to be tested according to the Andriks procedure, constant polarizations can be maintained for some time. Instead of the dextrorotatory power being decreased, as is the case with the usual procedure, it is slightly increased, this being due to the volume of lead precipitated.

The author points out that he has collected the results of a large number of experiments with different products of cane and beet-sugar manufacture, and that these show that when the above mentioned factors are considered, good results can be obtained with the method. In some tests between the Andriks hydrochloric acid and urea method (*E. S. R.*, 23, p. 207) and the Pellet sulphurous acid method for beet molasses the results obtained were practically the same.

In regard to determining the acidity of cane juice, P. A. YODER (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 9, pp. 640-646, Age. 2; obs. in *Ztschr. Angew. Chem.*, 25 (1912), No. 21, pp. 1082, 1083).—Most of the literature in regard to the determination of acids in wine fermentation products, fruit juice, etc., does not take into account the aconitic acid which is usually present, and which constitutes in Louisiana cane juice most of the acidity present. The utility of the well-known existing methods for isolating and determining the various acids present and the behavior of these acids and their salts toward solvents were studied. It was found that aconitic acid, succinic acid, and lactic acid can be easily removed quantitatively from the juice by extraction with ether, but tartaric, malic, and citric acids can not be isolated satisfactorily by this method.

In testing the solubility and the precipitability of the calcium salts of these acids the salt of aconitic acid was found to have the same property which calcium citrate possesses, i. e., precipitation by heat from its aqueous solution. The solubility of calcium malate in 50 per cent alcohol gives a basis for a method for separating it from other acids except lactic acids. The barium salts behave like the calcium salts in regard to solubility. The separation of aconitic acid from succinic acid in the shape of the acid ammonium salt was not satisfactory. Denigès' method was satisfactory for detecting citric acid but has the objectionable feature that it is also positive for aconitic acid.

A practical illustration for determining the several acids from cane juice is given.

Some recent work on molasses analysis, W. E. CROSS (*La. Planter*, 18 (1912), No. 22, pp. 382, 383).—A critical review of the literature in this regard.

The determination of nitrogen in betain, H. STOLTZENBERGER (*Ztschr. Ver. Deut. Zuckerindus.*, 1910, No. 675, II, pp. 440-445).—This is a contribution to the question of determining nitrogen in molasses and vinasse.

Complete oxidation of the betain can only be brought about by heating the sample with concentrated sulphuric acid for several hours. By the addition of copper sulphate, mercuric oxid, and phosphorus pentoxid to the acid mixture, the oxidation process can be accelerated considerably. To determine the nitrogen in substances containing betain the following procedure is recommended by the author:

About 3 gm. of molasses or 2 gm. of vinasse is placed in a 500 cc. Kjeldahl flask and 25 cc. of a sulphuric acid-phosphorus pentoxid mixture (100 gm. of phosphorus pentoxid in a liter of acid) and 1 gm. of powdered potassium sulphate and 1 gm. of mercuric oxid added. The mixture is then heated until decolorized, and 1 hour in addition. After cooling and diluting with 120 cc. of water, 2.2 gm. of powdered sodium thiosulphate and  $\frac{1}{2}$  teaspoonful of pipe-clay are added; the pieces of clay must have the size of a pinhead or of small shot. After setting up a receiver which contains 50 cc. of decinormal hydrochloric or sulphuric acid for collecting the distillate, 90 cc. of a 22 per cent sodium hydrate solution is added to the mixture, the flask quickly connected with the condenser and distilled until bumping begins. The remainder of the process is the usual one.

Extraction of oil from the olive, E. MINGIOLI (*Petite Rev. Agr. et Hort.*, 18 (1912), No. 421, pp. 133, 134).—A description of the Acapulco method and its advantages and disadvantages.

A comparative study of methods for the determination of hard and total soft resins in the hop, H. V. TARTAR and C. E. BRADLEY (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 3, pp. 209-212).—This is a comparative study of some of the present methods, including Briant and Meacham's, Siller's,

Lintner's volumetric method for soft resins (original and modified), and the authors' methods for determining the resin constituents of hops. The authors' methods, which they think will overcome some of the objections present in the other methods, are as follows:

"Ten gm. of hops is placed in a Soxhlet extractor and extracted with ether for 8 to 10 hours. The ethereal extract thus obtained is filtered and the filtrate made to 200 cc. volume.

"Total resins.—One hundred cc. of the ether solution (equivalent to 5 gm. of hops) is placed in a 250 cc. Erlenmeyer flask and nearly all of the ether removed by distillation on a water bath at about 40° C. The last portion of the ether is completely removed by drying in a vacuum desiccator at room temperature. The residue remaining is then taken up with alcohol to free the wax, filtered, and the filtrate made to 100 cc. volume. A 20 cc. aliquot (equivalent to 1 gm. of hops) is transferred to a tared beaker and the alcohol removed by evaporation in a vacuum oven at 50° to constant weight. The residue thus obtained is the total resins in 1 gm. of hops.

"Total soft resins.—The remaining 100 cc. of the original ether extract is transferred to a 200 cc. Erlenmeyer flask and the ether nearly removed by distillation at low temperature, the last portion being removed by evaporation in a vacuum desiccator at room temperature. The residue is taken up with about 100 cc. of petroleic ether (boiling point 40 to 45°). The residue is worked up in the solvent with a glass rod and then let stand a short time to effect the complete solution of the soft resins in the solvent. The hard resin is then removed by filtration. The petroleic ether is removed from the filtrate in the same manner as the ether in the first part of the determination. The residue is taken up with alcohol to remove wax, filtered, and the filtrate made to 100 cc. volume. An aliquot of 20 cc. (equivalent to 1 gm. of hops) is transferred to a tared beaker and evaporated and weighed as under the determination of total resins. The hard resin is estimated by difference between the total resins and soft resins."

The detection of methyl alcohol in commercial alcohol preparations, A. HELLMIGEL (*Pharm. Ztg.*, 57 (1912), No. 1, p. 7; *obs. in Chem. Ztg.*, 36 (1912), No. 21, *Repert.*, p. 102).—A portion of the sample is distilled and some of the distillate obtained is mixed with one-half its bulk by weight of burnt lime and boiled under a reflux condenser for 3 hours. The mixture is then distilled from a dry flask, which contains a thermometer, the boiling point is noted, some oxalic acid dried at 100° C. added, and the mixture kept boiling for 1 hour. On cooling, crystals of the dimethyl ester of oxalic acid, a liquid which has a boiling point of 54°, will be found deposited in the bottom of the flask.

The activities of the agricultural experiment station at Hildesheim, AUMANN (*Ber. Landw. Vers. Stat. Hildesheim*, 1911, pp. 15).—This report includes the results during 1911 in examining fertilizers, feeding stuffs, seeds, dairy products, stock feeds and condiments, and miscellaneous substances.

## METEOROLOGY—WATER.

The structure of the atmosphere in clear weather, C. J. P. CAYE (*Cambridge, England*, 1912, pp. XII+144, pls. 33, figs. 47; *rev. in Met. Ztschr.*, 29 (1912), No. 8, pp. 397, 398).—Data obtained from 200 pilot balloon ascensions at Ditcham, England, are summarized and discussed, together with the methods employed and their accuracy. "A general summary of the results obtained is given . . . in which certain types of structure in the atmosphere are recognized, and the different types are considered in their relation to the wind

at the surface, the gradient wind, and the general distribution of pressure and temperature in the region."

**Bulletin of the Mount Weather Observatory** (*U. S. Dept. Agr., Bul. Mount Weather Observ.*, 5 (1912), pt. 1, pp. 1-32, figs. 24).—This number contains the following articles: Daily Changes in Temperature up to 4,000 Meters (illus.), by A. J. Henry; and Free Air Data at Mount Weather for January, February, and March, 1912 (illus.), by W. R. Blair.

**Monthly Weather Review** (*Mo. Weather Rev.*, 40 (1912), Nos. 7, pp. 977-1142, pls. 9; 8, pp. 1143-1292, pls. 9).—In addition to the usual climatological summaries, weather forecasts and warnings for July and August, 1912, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 7.—The Richmond Tornado of May 12, 1912, by J. H. Kimball; Tornado at Grand Rapids, Mich., by C. F. Schneider; Local Storms in July, 1912, by U. G. Purcell, C. J. Root, and V. H. Church; A Phenomenally Heavy Rain at Alton, Ill., by M. W. Hayes; Severe Thunder Storm at Minneapolis, Minn., July 12, 1912, by M. R. Hovde; Wisconsin River Flood, July, 1912, by J. H. Spencer; Flood in Cherry Creek Basin, Colorado, July 14, 1912, by P. McDonough; Excessive Rains in Louisiana, by E. D. Coberly; Storm of July 19, 1912, Salt Lake City, Utah; Storm at Mazuma, Nev., by H. F. Alps; Recent Storms at Murray, Utah, by R. C. Towler; The Relation Between Light Precipitation and "Alkali," by R. A. Hart; Notes on the Rivers of the Sacramento and Lower San Joaquin Watersheds during July, 1912, by N. R. Taylor; Frost Fighting at Pomona, by J. E. Adamson; Variation of Rainfall with Altitude, by A. G. McAuliffe (see p. 817); Reconnaissance of the Deschutes River in July, 1912, by J. H. Lewis; Occurrence of Precipitation on Change of Wind to North with Approach of a High Barometer, by D. F. Manning; and Climate of Prince Georges County, Md.

No. 8.—The Avalon Tornado of August 21, 1912, by J. H. Kimball; Mammato-cumulus Clouds, by J. H. Kimball; Heavy Rainfall at Dubuque, Iowa, by J. H. Spencer; August, 1912, Flood of the Wisconsin River, by J. H. Spencer; Electric Induction by Clouds during Thunderstorms, by H. A. Friese; A Severe Storm at Concordia, Kans., by J. W. Byram; Tornado at Booneville, Ark., by H. F. Alciatore; Cause of the Equable Temperature Conditions at New Orleans, La., by E. D. Coberly; Notes on the Rivers of the Sacramento and Lower San Joaquin Watersheds during August, 1912, by N. R. Taylor; Notes on Streams and Weather of the Upper San Joaquin Watershed, by W. E. Bonnett; Note on Formation of a Cloud during Forest Fire, by F. H. Carpenter; and Dog Days.

The action of forests on late frosts, E. CURIE (*Ann. Sci. Agron.*, 4, ser. 1 (1912), 11, No. 3, pp. 161-166; *abs. in Rev. Sci. [Paris]*, 50 (1912), II, No. 24, pp. 755, 756).—Data regarding temperature conditions in forests and in the open are cited to show that forests lower the maxima and raise the minima of temperature, reducing the damage from late frosts.

**Distribution of the temperature at various heights from the ground during frost.** G. KOSLOVSKII (*Khoz'istvo*, 7 (1912), No. 25, pp. 841, 842; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 9, p. 1926).—Observations during a night of heavy frost showed the lowest temperature at a height of 2 ft. 4 in. above the ground. At 4 ft. 8 in. the temperature was almost twice as high and at 14 ft. the temperature was but slightly or not at all below freezing. "For this reason trees in flower suffered very little, less than shrubs; the leaves of the vine were scorched precisely at a height between 2 ft. 4 in. and 3 ft. 3 in."

**Variation of rainfall with altitude**, A. G. MCADIE (*Mo. Weather Rev.*, 40 (1912), No. 7, p. 1107).—Observations at different elevations on the San Joaquin River, California, are summarized. These show that the average increase in rainfall up to 3,500 ft. was at the rate of 1 in. per hundred feet. The average increase up to 2,441 ft. was at the rate of 0.73 in. per hundred feet, while the average rate of increase in the level between 2,441 and 3,500 ft. was at the rate of 1.45 in.

**Rainfall in tropical areas and variations observed corresponding to the changes in the moon's phases**, F. WHITE (*Proc. Rhodesia Sci. Assoc.*, 11 (1911), pt. 1, pp. 57-86, figs. 6).—A study of rainfall data at three places (Bulawayo, Selukwe, and Salisbury) lying within the tropics in South Africa, here presented in detail, are stated to indicate a decided correlation between rainfall and lunar phases. "The summaries of the totals of the three stations for each of the seven days of each lunar period give 6.44 in. of rainfall, which is the minimum, precisely at the time of the full moon, and 26.46 in. as the maximum, which falls one day after the day of the new moon. The next highest figure, 26.29 in., follows the day of the last quarter."

**Measurements of evaporation from lakes**, K. FISCHER (*Met. Ztschr.*, 29 (1912), No. 8, pp. 366-372, fig. 1).—Observations on lakes in the Alps and in Prussia are reported and discussed, particularly with reference to the accuracy of the methods used.

**Evaporation in Egypt and the Sudan**, J. I. CRAIG (*Cairo Sci. Jour.*, 6 (1912), No. 68, pp. 103-107; *abs. in Met. Ztschr.*, 29 (1912), No. 8, pp. 392, 393).—Data for measurements of evaporation in 6 districts of Egypt and the Sudan are summarized and the accuracy of the observations is discussed.

**The water supply of Indiana** (*Ann. Rpt. Ind. Bd. Health*, 29 (1910), pp. 349-356, figs. 4).—The results of examinations of a large number of samples of water collected by health officers are presented graphically and briefly discussed. The results show that the public water supplies were superior in character to the private supplies. Of the public water supplies examined 129 were from deep wells, 24 from shallow wells, 16 from streams, 14 from ponds or lakes, 7 from springs, and 1 from a cistern. The private supplies were drawn from 212 deep wells, 357 shallow wells, 24 springs, 31 cisterns, 3 streams, and 3 ponds. Of the 341 samples of deep well waters examined, 303 were good, 18 were bad, and 20 were of doubtful quality. Of the 381 shallow well samples 185 were of good quality, 158 bad, and 38 of doubtful quality. Of the 19 samples of stream waters examined 10 were good, 6 bad, and 3 doubtful. Of 17 samples of pond water 14 were good and 3 doubtful. Of 31 samples of spring water analyzed 22 were good, 2 bad, and 7 doubtful. Of 32 samples of cistern water 20 were of good quality, 11 bad, and 1 doubtful. A large percentage of the waters used by families in which a case of typhoid fever had occurred were unqualifiedly bad.

**Sewage sludge disposal**, W. B. RUGGLES (*Manfrs. Rec.*, 62 (1912), No. 15, p. 51).—This article briefly describes what is being done in a number of places in England in the way of utilizing sewage sludge as a fertilizer.

It is stated that "there is no question at the present time of the value of the sludge as a fertilizer. This has been amply proved, and there is a constantly increasing demand for it at prices ranging from \$5 per ton to \$12, depending on the amount of nitrogen contained."

"Where lime is used as a precipitant, part of the nitrogen is converted into ammonia and is lost, so that such sludge will only contain about 1.5 per cent of nitrogen, leaving a value of about \$8 per ton, while sludge precipitated by sulphuric acid or sulphates will contain at least 2.5 per cent, with a value of \$10 per ton or more."



"The cost of producing such fertilizer, including pressing the sludge, drying, grinding, and bagging, will vary somewhat with the size of the plant and quantity produced, but should not cost over \$1.75 per ton at any plant producing 10 tons or more per day."

### SOILS—FERTILIZERS.

What the States are doing toward the conservation and improvement of soil fertility, T. N. CARVER (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 24 (1912), Sect. XIb, pp. 47-57, fig. 1*).—This is an address delivered before the Eighth International Congress of Applied Chemistry in which the author gives an account of the activities of the various States in the promotion of irrigation and drainage work, the prevention of soil erosion by forestation and other means, and the direct improvement and conservation of the fertility of the soil by scientific methods of culture.

The author maintains that "the only legitimate purpose of soil improvement and conservation is to increase the product per man, and a larger product per acre is desirable only when it gives us a larger product per man." It is a thing to be shunned "if it is to be secured by those forms of intensive culture which are forced upon overpopulated countries where labor is abundant and cheap and land scarce and dear." Judged by the standard of utilizing labor so as to secure the largest income per man or per family, and thus to live upon as high an economic plane as possible, "our system of agricultural education makes an excellent showing as compared with that of other countries, though there is much to be done yet."

Recent advances in agricultural science.—The fertility of the soil, A. D. HALL (*London: Roy. Inst. Great Brit., 1912, pp. 9; Nature [London], 89 (1912), No. 2234, pp. 648-651; Sci. Amer. Sup., 74 (1912), No. 1920, pp. 246, 247*).—This is an address delivered before the Royal Institution of Great Britain in which the author outlines three stages in the development of the agriculture of a country, namely, (1) the period of exploitation, (2) the conservative period, and (3) the period of intensive agriculture, illustrating each by farming systems in vogue in different countries and tracing the inner history of these three stages of agriculture by the records of certain experimental plots at Rothamsted.

It is shown that in maintaining the level of intensive production the losses, particularly that of nitrogen, due to bacteria in the soil, are increased out of all proportion until there is recovered in the crop only about one-fourth of the nitrogen applied in the manure. Hence, there must be returned to the soil not merely the nitrogen contained in the extra amount of crop produced but several times that amount to repair the waste, and still greater amounts when the fertility and the production are increased.

In the author's opinion, therefore, the important problem in intensive agriculture to-day is the reduction of this waste of nitrogen due to bacterial action. He points out, on the basis of the work of Russell and Hutchinson at Rothamsted (*E. S. R., 22, p. 121*), that by putting the soil through various processes of partial sterilization, such as heating or treatment with antiseptics like chloroform or toluene, "we can eliminate certain organisms which keep in check the useful bacteria in the soil, that is, the bacteria which break down the nitrogen compounds to the state of ammonia, a form assimilable by plants. . . . At present the processes have not been extended to the open field, but progress is being made in that direction, and give some promise of a method by which ultimately the unseen fauna and flora of the soil will be domesticated, the useful races encouraged, and the noxious repressed."

Some problems in soil fertility, G. SEVERANCE (*Washington Sta. Popular Bul.* 44, pp. 8).—This is a brief, popular discussion of various factors influencing the fertility of soils, with particular reference to Washington soils.

A case of soil infertility due to bad texture and lack of lime, J. A. HANLEY (*Jour. Bd. Agr. [London]*, 19 (1912), No. 5, pp. 375-378).—With a view to determining the cause of the infertile condition of the soil of a portion of a field near Luton, Bedfordshire, the author made physical analyses of the soil and determined its calcium carbonate content. The results showed that the infertile condition was due to the unfriable nature of the soil, caused by its low calcium carbonate content, the samples analyzed containing 0.28 per cent of this constituent in both surface and subsoil, as compared with 2 per cent for the surface soil and 1 per cent for the subsoil of samples of the productive soil of the field.

Reference is also made to analyses of samples of soil of the Geescroft field at Rothamsted and of a similar soil at Hamsey Green, Surrey, both of which showed a low calcium carbonate content and were in a very poor state of tilth.

Studies on soil physics.—II, The permeability of an ideal soil to air and water, W. H. GREEN and G. A. AMPT (*Jour. Agr. Sci.*, 5 (1912), No. 1, pp. 1-26, pl. 1, figs. 10).—The authors review previous investigations on the subject by others, particularly the work of Slichter and of King (E. S. R., 11, pp. 519, 523), and in continuation of earlier work (E. S. R., 25, p. 620) report measurements of the permeability of glass beads and quartz sand to air and to water. An elutriation method and apparatus for grading the particles are described.

The permeabilities of the glass beads, both to air and water, were from 50 to 85 per cent greater than the value calculated from Slichter's formula. This is held to be due to Slichter's method "of considering each soil capillary as if it were a double triangular-shaped pore with a partition down the center instead of as an undivided more or less rhomboidal pore at its narrowest part." When this condition was fulfilled, the permeability of the glass beads approached the value calculated in the formula.

The permeability of the sand, although subject to a rather large percentage error, was on an average "9.45 for the permeability to air . . . and 9.31 for the permeability to water. . . . The obvious explanation (of this less perfect material agreeing more perfectly with the theoretical formula) is that the angular shapes of the particles do practically have the effect of dividing the pore into two triangular passages as assumed in the formula."

The general conclusion, therefore, is that "the formula  $\eta P = 10.2 \frac{d^2}{k}$  holds quantitatively for variations of the pore space and of the diameters of the soil particles. This will be so whether the permeating fluid be air or water, provided that the actual sizes of the soil particles are unaffected by the presence of water.

"With this factor taken into account it is, therefore, legitimate to consider a soil as statistically composed of a bundle of capillary tubes when discussing the movements of air and water through it."

Observations on liquids circulating in cultivated soils, G. GOLLA (*Ann. R. Accad. Agr. Torino*, 54 (1911), pp. 33-67, fig. 1).—This article has been noted from another source (E. S. R., 26, p. 422).

The movement of water in irrigated soils, J. A. WIDTSON and W. W. McLAUGHLIN (*Utah Sta. Bul.* 115, pp. 195-268, figs. 8).—This is a detailed report of a series of irrigation investigations conducted by the Utah Station in cooperation with this Office, and reports a study of the mutual relationships of water, soils, and crops under cropped field conditions, the work having been partly reported upon in previous publications (E. S. R., 22, p. 425). The ex-

periments were made on a deep soil of uniform physical and chemical composition at the experiment farm at Greenville. The irrigation water used contained less than 375 parts per million of dissolved substances.

Summarizing the results of the work, the authors conclude that the maximum amount of water held by the soil in question against gravity under field conditions was about 24 per cent (on a dry basis) and the minimum amount above 8 per cent except that the soil of the top foot dried out to 5.64 per cent.

"Irrigation was needed whenever the soil moisture fell below 12 per cent.

"The degree to which water may be removed from the soil depends upon the kind of crop grown; and the degree of dryness at which irrigation is necessary likewise depends, in a limited measure, upon the kind of crop.

"Soil water was abstracted from below the depths of root penetration.

"Water applied in irrigation, whether of large or small amount, penetrated in the soil below the depth reached by augers, 8 ft. long.

"The percentage of soil water soon after an irrigation was invariably largest in the top foot, and became smaller with increasing soil depth.

"Under given conditions of soil, crop, water, and time after irrigation, the distribution of the soil water is always the same. This implies the operation of a definite law governing the distribution of soil water.

"It would seem that the water added to a soil of the Greenville type, up to about 12.75 per cent on the dry basis, is held very firmly by the soil, and can move only with great difficulty. Water added above this point moves freely in obedience to capillary laws.

"It is suggested that the point below which capillary movements become sluggish be called the point of lento-capillarity.

"It would appear that water added to a soil above the point of lento-capillarity is distributed through the soil inversely with the distance from the source of supply, which is the zone of wettest soil. This law of distribution takes the form of the formula of the equilateral hyperbola.

"Plants may use the soil water below the point of lento-capillarity, but not readily.

"Plants can not use any of the true hygroscopic water. The hygroscopic capacity depends largely on the amount of clay or other colloidal substances found in the soil.

"In soils of the Greenville type, under field conditions, there are several critical soil water points: The maximum capillary water content, which is about 24 per cent; the optimum water content, to a depth of 8 ft., about 18 per cent; the lento-capillary point, about 12.75 per cent; and the hygroscopic capacity about 6 per cent.

"In furrow irrigation, the amounts of water under row and furrow are unequal near the surface, but become more uniform at lower soil depths. This indicates that the lateral movement of soil water increases with the depth.

"Evaporation from bare soils is large, but may be checked by early and thorough cultivation. On the Greenville farm, under average conditions on cropped plats, a little more water was taken from the soil by evaporation than by transpiration. The rate of loss of soil moisture from cropped soils depends on a number of factors.

"The removal of water from the soil by transpiration varies with the ease with which water may be obtained, that is with the amount of water in the soil at the beginning of an experiment. It would appear that the rate of loss of soil water varies directly with the cube root of the percentage of water in the soil above the point of lento-capillarity.

"The loss of soil water increases steadily with the time after irrigation. Moisture conserving methods should, therefore, be applied early.

"The relation of meteorological conditions to the rate of loss of soil water is important, but somewhat obscure. Temperature is probably the most important factor; then sunshine; and then relative humidity.

"The larger the percentage of water in the first foot, the more rapidly is water drawn from the soil. This is probably due in part to the larger development of plant roots near the surface.

"Early maturing crops cause the highest rate of loss of soil moisture. Different crops leave different percentages of water in the soil at the time of harvesting.

"The rate of loss of soil water varies with the age of the crop. Less water is used during the early and late periods than during the middle one.

"When water is abstracted from a soil, the loss is felt by every foot to the depth reached by the augers.

"When a practical irrigator declared irrigation to be necessary, the soil was found to contain from year to year about 13 per cent of water."

The biochemical relation of phosphoric acid in the soil, MÜLLER (*Mitt. Deut. Landw. Gesell.*, 27 (1912), No. 33, pp. 470, 472, 473).—This is a review of the work of Stoklasa (*E. S. R.*, 25, p. 624) on this subject.

Soil conditions and plant growth, E. J. RUSSELL (*New York, Bombay, and Calcutta*, 1912, pp. VIII+168, figs. 9).—This treatise by the former soil chemist and present director of the Rothamsted Experimental Station, is one of the series of monographs on biochemistry edited by R. H. A. Plimmer and F. G. Hopkins. Its purpose is to give a concise and orderly account of the present knowledge of the soil as a medium for plant life. It is a comprehensive critical survey of the literature of this subject, and while presenting the gist of the more important and fundamental contributions to the knowledge of the subject, points out what has really been demonstrated and in what directions further investigation is necessary. The book is therefore of special value to the investigator.

The first chapter is historical and introductory, others deal with the requirements of plants, the constitution of the soil, the carbon and nitrogen cycles in the soil, the biological conditions in the soil, the soil in relation to plant growth, and soil analysis and its interpretation. An appendix gives methods of soil analysis and a select bibliography of the subject.

Some observations on the effect of soil aeration on plant growth, C. HUNTER (*Proc. Univ. Durham Phil. Soc.*, 4 (1911-12), No. 4, pp. 183-186, pls. 2).—Observations on the growth of sunflowers, peas, wheat, and cress in soils of five different textures with and without artificial aeration are reported. Observations were also made on the varying moisture and bacterial contents and on the resistance of the soils to the movement of air.

The results indicated an optimum amount of circulation of air in the soils for different kinds of plants. "The circulation of the air in the soil affects the development of the root system and through that the development of the subaerial portions of a plant. The production of artificial air currents in the soil appears to be beneficial to plant growth. This point is at present undergoing further investigation."

The relation of different systems of crop rotation to humus and associated plant food, G. W. WALKER (*Minnesota Sta. Bul.* 128, pp. 165-186).—The author reviews investigations by others on the physical and chemical properties of, and methods of determining, humus and in continuation of previous work by Hays (*E. S. R.*, 20, p. 435), reports a study from 1895 to 1905 of the changes produced in humus and of the proportion of the total nitrogen, phosphoric acid, and potash associated with the humus in soil of plots under known cropping and fertilizer systems. The term humus is used by the author to

designate that portion of the organic matter of the soil soluble in dilute solution of ammonia and sodium hydroxide after removal of the lime and magnesia by treatment with dilute hydrochloric acid.

The centrifugal method was used in making the determinations, a preliminary comparison of this and the official method having shown that by using the centrifuge the time was considerably shortened and the results were equally accurate. The humus ash was a little lower for the centrifugal method.

Summarizing his results the author concludes that "continuous cropping to corn, mangels, and wheat causes a depletion of humus; on the other hand, field peas increase the amount of humus. Generally rotation of crops increases the amount of humus, the increase being greatest when clover is plowed under. There is a fair agreement in regard to the direction of the changes in humus as compared with the changes in total nitrogen and humus-nitrogen; continuous cropping causing depletion, and rotation of crops an increase.

"Except in the case of wheat, no marked decrease in total phosphoric acid has occurred in the continuously cropped plats. Generally, under systems of crop rotation, the plats have maintained the total phosphoric acid content for the 10-year period. The humus-phosphoric acid has decreased in all the plats, with one exception, both under continuous cropping and systems of crop rotation; the depletion being greater in the continuously cropped plats.

"No definite conclusions can be drawn from the results obtained for total potash. However, a much greater depletion occurs in the case of wheat than in the other continuously cropped plats. In general, a marked decrease in humus-potash has occurred in the continuously cropped plats, as compared with the rotation plats. In the rotation plats a decrease of humus-potash has occurred in all the plats, except those which received applications of stable manure. The relatively large proportions of nitrogen, phosphoric acid, and potash associated with the humus indicate the great importance and value of the latter as a source of plant food."

The distribution and activities of bacteria in soils of the arid region, C. R. LIPMAN (*Univ. Cal. Publ. Agr. Sci.*, 1 (1912), No. 1, pp. 20).—Recognizing the important differences in physical and chemical characteristics between soils of humid and those of arid regions as shown by the work of Hilgard and Loughridge, the author undertook a study of the ammonifying, nitrifying, and nitrogen-fixing powers of different soil types of the arid region of California as compared with those of humid sections. The determinations were made for every foot of soil to a depth of 12 ft. A modified Remy solution method was used, since the direct soil culture method was not considered feasible for obtaining in an uncontaminated condition such large amounts of soil as these experiments required. The samples of soil were obtained "from a hole 12 ft. in depth with at least one vertical wall, the latter when sterilized being sampled."

It was found that these soils, which are considered typical of the arid region, showed ammonifying powers at all depths studied but generally most vigorous in the first 6 or 8 feet. "In one case ammonification was noted in soil from a depth of 15 ft. or adjoining the water-table."

Nitrification occurred commonly down to a depth of 5 to 6 ft. In one case soil from the 8 ft. depth showed a vigorous nitrifying power. There was no nitrogen fixation through *Azotobacter* "below 2 ft. in the soil usually, but [it] has been found in some soils at 3 ft. and in one soil down to 4 ft. Many soils in the arid region, otherwise favorably constituted, do not contain *Azotobacter* organisms."

In general, the lower layers of arid soils differed markedly from those of humid regions in ammonification and nitrification and to a less extent in nitro-

gen fixation. These characteristics "help to explain the favorable physical and chemical constitution of the soil and also the deep rooting of plants so characteristic of the arid regions."

The law of minimum, I. POUGET and D. CHOUGHAK (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 4, pp. 303-306, figs. 2).—Referring to an article by P. Mazé noted elsewhere (*E. S. R.*, 27, p. 721), the authors offer what is claimed to be strong experimental evidence in favor of a law of minimum which, it is claimed, plays an important part in large scale cultivation, especially in dry soils.

A contribution to the knowledge of the black cotton soils of India, W. H. HARRISON and M. R. AMASWAMI SIVAN (*Mem. Dept. Agr. India, Chem. Ser.*, 2 (1912), No. 5, pp. 261-280, pls. 4; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 20, pp. 999, 1000).—The authors review previous investigations on the subject by Leather (*E. S. R.*, 10, p. 421) and by Annett (*E. S. R.*, 23, p. 316), and report studies of the geological distribution of the regur or black cotton soils of India and the chemical and physical characteristics of the soil particles, with a view of determining the cause of the black color of the soils.

It is concluded from the results that "the black cotton soils of India are not derived from any specific geological formation, such as trap, but are formed from many diverse formations and generally, when not alluvial, bear a close relationship to the underlying rocks.

"Titaniferous magnetite is not a constant factor in the regur soils of the Madras Presidency, and, even when found, the amount is small, but its presence in quantity is characteristic of the soils of the trap area. It can not, therefore, be looked upon as the cause of either the color or the physical properties of these soils, but only as a modifying agent.

"The color and peculiar physical properties of black cotton soils are associated with the compound particles of low specific gravity, which are found in all these soils.

"Two classes of substances have been recognized as conferring the color and physical properties. One is probably a colloidal hydrated double iron and aluminum silicate, which is mainly concerned with the formation of compound particles and which possesses, in a modified form, the properties of ordinary clay. The other is organic in character and may possibly be an organic compound of iron and aluminum."

The soils of Webster County, A. M. PETER and S. C. JONES (*Kentucky Sta. Bul.* 162, pp. 135-169, pl. 1).—This bulletin, which is based on work done in cooperation with the Kentucky Geological Survey, reports a survey with map of the soil types of the county, including mechanical and chemical analyses of typical samples and pot experiments with a soil similar to the upland type of the county, to determine the fertilizer and crop adaptation.

The area is typical of the western coal field of Kentucky, including about 4,500 square miles or about one-eighth of the total area of the State. The soil types established are the yellow silt loam (hilly), the yellow silt loam (undulating), gray silt loam, gray clay loam, and a dark-brown clay loam covering, respectively, 36.1, 27.3, 25.3, 8.1, and 3.2 per cent of the area.

The results of preliminary pot fertilizer tests seem to indicate on the whole that "phosphorus decidedly increased the yields of wheat, oats, and clover, but not that of tobacco; that nitrogen decidedly increased the yields of wheat, oats and tobacco, but not that of clover; that potassium moderately increased the yields of wheat and oats and slightly increased that of clover, but did not have a marked effect on that of tobacco. Rock phosphate, used alone, gave consistent gains, except with tobacco. Used with manure, however, its effect seems to have been negative, contrary to the usual teaching. Limestone pro-

duced moderate increase with oats and clover and with tobacco if flowing clover. Used with phosphorus on clover there was a decided increase over the pot where phosphorus alone was tried."

Protocol of the sixty-eighth session of the Central Moor Commission (*Protokoll der 68. Sitzung der Central-Moor-Commission. Berlin, 1912, pp. 258, pls. 2, fig. 1*).—This is a detailed report of the proceedings of this commission at its session from February 29 to March 2, 1912. Reports are given as to the progress made by the various local associations in the colonization of these lands and in the production of different crops and methods of cultivation and fertilization. A report of the work of the moor experiment station, consisting principally of studies in crop adaptation and methods of cultivation and fertilization of the soils, is included.

Report of the chemist, P. L. GILE (*Porto Rico Sta. Rpt. 1911, pp. 15-23*).—This is a brief report of progress in the examination of bat guanos (see p. 825), study of the effect of the lime-magnesia ratio in plant growth, effect of calcareous soils on the composition and health of plants, and the treatment of "sick" red clay soils.

The atmosphere as a raw material in fertilizer production (*Manfrs. Rec., 62 (1912), No. 11, pp. 48, 49*).—This article refers to the installation of a plant for the manufacture of calcium nitrate from the nitrogen of the air at Nitrolee, S. C., and to a proposed plant for the same purpose in Alabama. It also discusses briefly the present status of the manufacture of nitrogen compounds from the air.

Supposed loss of nitrogen in calcium cyanamid (nitrolime), G. LIBERI (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 5 (1911), pp. 163-177; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 18, p. 890*).—Exposure for 50 days to severe and constantly changing atmospheric conditions resulted in a loss of only about 3 per cent of the total nitrogen of the cyanamid.

Instability of the cyanamid nitrogen in calcium cyanamid (nitrolime), G. LIBERI (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 5 (1911), pp. 179-197, figs. 2; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 18, pp. 890, 891*).—Loss of nitrogen from crude calcium cyanamid was greatest in damp air and but slight in dry air. The nitrogen of the cyanamid completely disappeared in 1 and 5 per cent solutions, rapidly at first, more slowly afterwards. The loss was more rapid in the stronger solution. The dicyandiamid nitrogen increased rapidly at first and then gradually declined. No ammonium compounds were found in either solution.

A new artificial manure (*Queensland Agr. Jour., 29 (1912), No. 4, pp. 315, 316*).—Brief reference is here made to a British consular report from Christiania, Norway, calling attention to a by-product of the manufacture of nitrate of lime at Notodden, Norway, known as biphosphate and containing 26 per cent of phosphoric acid, 92 per cent of which is citrate-soluble, and 23.8 per cent of nitrate of lime.

The principal catalytic fertilizers, E. MIKES (*Jour. Agr. Prat., n. ser., 24 (1912), No. 32, pp. 171-173*).—A brief résumé is given of results of experiments by various investigators on the fertilizing effect of compounds of manganese, boron, aluminum, zinc, uranium, copper, lithium, bromine, fluorine, and iodine. The author concludes that the results obtained in experiments with these compounds emphasize the insufficiency of our knowledge of the physiology and chemistry of plants and indicate enormous possibilities in the way of extending and improving methods of fertilizing the soil.

[The toleration of coffee and of cacao plants for sodium chloride], J. KULPER (*Deuts. Landb. Surinam. Verslag, 1911, pp. 11, 12*).—In view of the fact that the water available for sprinkling and also for irrigation purposes

during dry seasons in Dutch Guiana contains rather large amounts of sodium chloride, experiments were made with coffee and cacao plants grown on red sandy soils in plats and in pots, respectively, to determine the amount of this salt which these plants would tolerate.

In case of the coffee plants, it was found that a concentration of 0.1 per cent showed a slight discoloration of the leaves in only one case, whereas the use of water containing 0.3 per cent caused considerable injury, as was manifested in the shedding of some of the leaves. A 1 per cent solution killed the weaker plants and caused some discoloration of the leaves of the more vigorous plants.

In case of the cacao plants, it was found that the 2, 3, and 4 per cent solutions had a direct injurious effect. The leaves became markedly discolored and dropped off. There was only a very slight injury in case of the 1 per cent solution. The 0.5 per cent solution did not injure the plants to any appreciable extent.

The availability of the nitrogen and phosphoric acid in bat guanos, P. L. GILK (Porto Rico Sta. Rpt. 1911, pp. 16-18).—Analyses of 18 samples of Porto Rican bat guanos are reported and reference is made to plat experiments to correlate their actual relative fertilizing value with the chemical analyses. These samples showed nitrogen varying from 0.4 to 5.49 per cent and phosphoric acid from 4.35 to 26.18 per cent.

Regarding the fertilizer value of pond mud, P. KOSOVICH (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 13 (1912), No. 4, pp. 537-549).—A comparative study of the composition of mud of a pond situated near Orel, Russia, and of the soil of the surrounding district is reported.

The results show that the mud analyzed did not have a high fertilizer value, and that its constitution was similar to that of the local soils. The calcium carbonate and the magnesium carbonate contents of the mud were relatively high (about 3 per cent combined), notwithstanding the almost entire absence of these constituents in the soil, thus indicating that the pond water was not derived alone from the surface water but also from waters of the calcareous loess substratum.

The high citric-acid-soluble character of the phosphoric acid of the mud was significant, 0.15 per cent, or approximately ten times that of the soil, being soluble, notwithstanding the fact that the total phosphoric acid content of the mud was only slightly higher than that of the soil (0.32 per cent and 0.298 per cent, respectively). The potash content soluble in 10 per cent hydrochloric acid was 0.44 per cent for the mud as compared with 0.24 per cent for the soil. The amount of water-soluble constituents of the mud was relatively high, being 0.36 per cent before, and 0.23 per cent after, ignition. The nitrogen content of the mud was 0.27 per cent as compared with 0.345 per cent for the soil.

Guadeloupe's use of fertilizers, F. T. F. DUMONT (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 256, pp. 556, 557).—Statistics of the fertilizer trade in Guadeloupe are briefly summarized. It is shown that in 1911 4,360 metric tons of fertilizer, valued at \$293,769, were used, or an average of 109 lbs. per acre of cultivated area. These fertilizers were imported almost exclusively from France and Great Britain.

Fertilizers in Russia (*Bd. Trade Jour. [London]*, 78 (1912), No. 815, p. 74; *Handelsmuseum*, 27 (1912), No. 24, p. 350; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 9, pp. 1956, 1957).—It is stated that there has recently been a substantial growth in the consumption of chemical fertilizers in Russia, which may be attributed either to the agricultural progress of the country or to partial exhaustion of the high fertility of some of the soils, black soils in particular. The fertilizers are now largely



imported, the imports nearly trebling in the 5 years, 1907 to 1911. In the latter year the imports amounted to 362,929 tons valued at \$3,675,060.

### AGRICULTURAL BOTANY.

The influence of the concentration of dissolved nutritive substances on their absorption by plants, I. POUET and D. CHOUCHAK (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 25, pp. 1709-1711, fig. 1).—Continuing previous work regarding the relations between the concentration of dissolved nutritive substances and their absorption and assimilation by plants (*E. S. R.*, 24, p. 423; 25, p. 127), the authors make the following statements:

At very low concentrations (in case of phosphoric acid less than 0.1 mg. per liter) absorption of the solute does not take place, but such substance tends rather to pass from the cells containing it into the solvent in either mineral or organic form. If, however, the concentration of the solute is continuously raised, absorption begins at a certain point (a) and its rate increases faster than does that of concentration. At a second point (b) the two rates become proportional and remain so to a third point (c) beyond which concentration increases faster than absorption, the latter now being regulated not by concentration but by utilization of that solute by the cell. The general course of these changes depends upon the particular substance absorbed, the state of the plant, and the vegetative period in which it is tested.

It was found that in very dilute solutions the absorption of nutritive substances was much greater than that of the water. The above results are held to show (1) that soil water, in spite of its low content of the elements of fertility, ought to play an important rôle in the elaboration of crops; (2) that is, if the concentrations of all the elements necessary to the plant are higher than the point (c), nutrition goes on normally and the crop does not depend upon climatic conditions; but (3) if the concentration of such elements (or even only of one, according to the law of minimum) is below that point the crop returns will depend upon the concentration of that element.

The influence of radio-active mineral on the germination and on the growth of wheat, A. J. EWART (*Jour. Dept. Agr. Victoria*, 10 (1912), No. 7, pp. 417-421).—The author tested the influence of radio-active mineral, known to accelerate germination of cereals, on the development of bacteria and on the growth of wheat when applied as a manure. It was found that in the first case a distinctly retardative action is exercised which becomes more pronounced with longer exposures, and that in the second any early stimulating effect becomes converted into an injurious one on prolonged contact. He concludes that, in practicable applications, radio-active material does not appear to have any direct value for the growth of wheat.

The action of uranium on the vegetable cell, C. AOUA (*Arch. Pharmacol. Sper. e Sci. App.*, 14 (1912), No. 2, pp. 81-84).—Pursuant to previous investigations on the influence of radio-active substances on the life processes of plants (*E. S. R.*, 24, pp. 230, 531) the author now reports that uranium can be absorbed by certain cells of higher plants, in which it hinders karyokinesis, checking cell division. This influence is said to be considerable in the tissues of the root system, but much less so in the stem tissues on account of less ready absorption there. Thorium and manganese are said to show somewhat analogous properties, but the latter in much less degree and in a way more compatible with the development of the plant.

The influence of narcotics on the chemical composition of plants.—I. The chemical behavior of plants in acetylene atmosphere, V. GRAF and O. RICHTER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl.*, 120 (1911).

I, No. 10, pp. 1187-1229).—This report, in continuation of work on the influence of gases on plants (E. S. R., 25, p. 484), gives the results obtained by the authors in their study on the development and chemical products of potato, flax, and various leguminous plants grown in dilute acetylene gas.

Acetylene in various dilutions (from 0.69 to 0.038 per cent by volume) was found to give marked contrasts in development as compared with those of the control plants. For example, in dilute acetylene there was shown more glycerin and fatty acid, but less sugar, fat, and amido compounds than in plants grown in pure air. Corresponding to these chemical conditions and in part explained by them are noted such physiological differences as heightening of turgor, bursting of seedlings, checking of growth in length, augmentation of that in thickness, etc.

A bibliography is given.

The influence of ultraviolet rays on higher plants, A. J. KLUYVER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl.*, 120 (1911), I, No. 10, pp. 1187-1170, pl. 1).—After reviewing briefly similar studies by other investigators, the author reports on his own experiments with ultraviolet rays from the mercury vapor lamp on various plants in regard to the effect of these short wave lengths on the life of the cells and on their coloring matters and starch.

It is said to have been found that several higher plants are injuriously affected by the mercury vapor light, this effect being attributed mainly to radiations of shorter wave length than  $300\mu$ , and being prevented by interposition of glass plates of 0.2 mm. thickness, which are known to absorb nearly all such short waves. It is held that such short solar rays are absorbed by the atmosphere, rendering artificial protection to these plants unnecessary. The injurious effects of waves longer than  $300\mu$  are said to be limited in case of leaves to the epidermis, but sometimes to extend more deeply in case of stems and roots.

Anthocyanin appears, in general, to be not very sensitive to ultraviolet rays, being removed only from the lower leaf surface of *Begonia discolor* and that simultaneously with the death of the epidermal cells. Chlorophyll is little, if at all, affected by the longer waves, which alone are able to penetrate to the parenchymatous cells. In isolated cases (*Nerium oleander* and older needles of *Taxus baccata*) the cuticle protected even the epidermal cells from the injurious action of the shorter waves. Leaves of *Mimosa pudica* showed stimulation response to the ultraviolet rays. Destructive changes are said to have been produced in the woody walls of certain cells, and starch is said to show a decrease on exposure to these shorter wave lengths.

The influence of light on the flowering of Japanese hops and hemp, J. TOUANOIS (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 4, pp. 297-300).—The author reports further experiments (E. S. R., 26, p. 432) with *Humulus japonicus* and *Cannabis sativa* in regard to their time and mode of flowering, in the present cases as related to differences in illumination.

Plantings of seeds were made on January 8 and 28, and the plants obtained from each group showed, as in previous experiments, an early and a late flowering period. The precocity of flowering in this case was augmented in correspondence with early planting and the weaker illumination of the winter days. Plants from seeds sown late in April and also those from sowings early in June (normal) and grown in darkness from 8 a. m. to 2 p. m. daily, flowered much more precociously than did plants normally illuminated but otherwise similarly treated.

The sexual anomalies previously noted are said to have been more accentuated in plants obtained from the earlier winter seedlings made in the present

series of experiments. Decreased illumination is held to be an important factor in all these anomalies.

The relations between oxidation ferments and respiration in plants, E. W. SCHMIDT (*Naturw. Wehnschr.*, 26 (1911), No. 17, pp. 257-264; obs. in *Bot. Centralbl.*, 119 (1912), No. 20, pp. 492, 493).—This is a critical review of recent articles on respiratory ferments, etc., particularly those of W. Palladin and his school.

Tannin content and starch formation in woody growths, A. RENVALL (*Bot. Centralbl., Beihefte*, 28 (1912), 1. Abt., No. 2, pp. 282-306).—The author made a study of numerous trees as to the relation of their tannic acid content in the winter to their development of starch in the following spring.

It was found that in those structures deficient in tannin and in those trees in which it appeared wholly wanting there was no corresponding lack of starch development in spring. From a study of the details observed the conclusion is drawn that tannin in the cases studied can have little or no significance as a transformation product, or as an agent influencing transformation, so far as starch is concerned. Further studies are promised on starch transformation in leaves which remain green during the winter.

Some conditions influencing the fixation of nitrogen by *Azotobacter* and the growth of the organism, FLORENCE A. MOOKERIDGE (*Ann. Bot. [London]*, 26 (1912), No. 103, pp. 871-887).—The author's investigations on the production of a vigorous culture of *Azotobacter* led to the following conclusions:

The presence in the medium, as a neutralizing agent, of an excess of calcium or magnesium carbonate or of basic slag, is more advantageous than that of sodium hydrate. The presence of sodium salts is unnecessary and depressing. A good growth being once obtained, the yield of nitrogen appears to be practically proportional to the food supplied. The most active fixation occurs during the first week, being thereafter depressed; apparently, by the accumulation of the products of vital activity. It appears that a proportion of 0.4 per cent of basic slag has the most beneficial effect upon the activity of the organism, 1 per cent showing a second and lower maximum. It is thought probable that the iron and manganese present in the slag exert, in addition to a neutralizing effect, tonic influences upon the organisms, these reaching maxima at 0.4 and 1 per cent, respectively.

The formation and physiological significance of the root nodules in the Podocarpaceae, ETHEL R. SPRATT (*Ann. Bot. [London]*, 26 (1912), No. 103, pp. 801-814, pls. 4).—The author reports on a series of investigations made with *Podocarpus*, *Microcachrys*, *Dacrydium*, *Saxegothaea*, and *Phyllocladus*, all possessing root nodules. These nodules are claimed to be modified lateral roots, perennial and usually unbranched.

*Pseudomonas radiclecola* penetrates by way of a root hair to the cortical cells of the root, where it propagates itself, infecting the meristematic tissue and stimulating the development of a nodule which, when mature, is traversed for about half its length by a small stele. Nodules of the Podocarpaceae differ from those of all other nonleguminous plants in that there is no differentiation of a meristematic zone in the cortical tissue. Many cortical cells of root and nodule eventually become water storage cells, some containing bacteria in a quiescent state during the winter. The bacteria form a very definite zoogloea in the cells, slime threads passing from cell to cell.

The bacteria isolated from the nodules of the Podocarpaceae are found to be identical with *P. radiclecola* obtained from those of the Leguminosae, Cycadaceae, Equisetaceae, Alnus, and Myrica; capable of assimilating atmospheric nitrogen; and presumably of benefit to the Podocarpaceae.

A bibliography is given.

On well-marked aerotropic growths of *Bacillus megatherium*, J. C. JOHNSON (*Ann. Bot.* [London], 26 (1912), No. 103, pp. 949, 950).—The author reports of his observations made for 3 years with the annual periodicity of growths of this bacterium on the dead extremities of the roots of a palm. The growths are still being watched for any gradual change from the flat films to the raised growths observed, in the hope of showing a connection between ordinary free-living bacteria and the more highly specialized fructifications of the *Myrobacteriaceae*.

*Spiraea ulmaria* and its bearing on the problem of xeromorphy in marsh plants, R. H. YAPP (*Ann. Bot.* [London], 26 (1912), No. 103, pp. 815-870, pls. 5, figs. 11).—This is a study of the xerophytic characters exhibited by meadow sweet, reviewing also the present state of knowledge in regard to swamp xerophytes, and leading to the following general conclusions:

Xeromorphy is of physiological utility to those bog and marsh plants which exhibit such characters, these being directly related to the needs imposed upon the plant by the special nature of its habitat. In each case, however, the special regulatory devices are required to meet not so much the every-day needs as the extremes, possibly even only the occasional extremes which the species has to face in nature.

An extensive bibliography is given.

Studies on the progress of plasmolysis, K. HECHT (*Beitr. Biol. Pflanz.*, 11 (1912), No. 1, pp. 187-192, pls. 2, figs. 6).—The author reports that, in studies made by him of plasmolyzed cells, he still observed, following the rupture and separation of the cytoplasmic envelope from the cell wall, numerous connecting threads of very different sizes, and also connecting with these a protoplasmic network adhering closely to the cell wall. To both these structures, it is thought, both hyaloplasm and nucleoplasm contributed, microsomes and chlorophyll grains being found together, particularly in the larger plasma masses remaining near the cell wall. The presence of this lining, it is thought, may be the result of some interaction of the plasmic components.

The part played by living cells in sap ascent, A. UNSPRUNG (*Bot. Centralbl.*, *Beihfte*, 28 (1912), 1. Abt., No. 2, pp. 311-322).—The author discusses the work of several other investigators as well as some of his own on this subject, concluding with the assertion that the efforts of Dixon and Overton (*E. S. R.*, 21, p. 318; 25, p. 220) to refer the death of the leaves after partial death of the stem to poisoning or to plasmolysis are not conclusive; also that the same may be said in regard to Overton's defense of the view that sufficient water may be carried past killed portions of the stem for the nourishment of the leaves.

Studies on regenerative processes in plants, B. KABUS (*Beitr. Biol. Pflanz.*, 11 (1912), No. 1, pp. 1-52, figs. 23).—Investigations were made on both the underground and aerial parts of a considerable number and variety of plants regarding their modes and rates of forming new tissue when wounded, as for example in grafting, the conditions under which it occurs, and the factors favoring or hindering its occurrence.

It was found that cork formation in case of wounded potato tubers follows access of air. Sugar formed at the cut surface in the presence of air was partly withdrawn and partly utilized in the formation of wound periderm. The cut cells turned brown on contact with air. The presence of eyes is not necessary to the growing together at the cut surfaces by two tubers, but it does hasten such union. Lower temperatures may prevent the union even of tubers provided with eyes. The vascular bundles seemed to play an important part in this process.

In subterranean parts of *Dahlia variabilis*, *Sauromatum guttatum*, and *Bougainvillea baselloides* the presence of buds was not necessary to union, but it

was essential to that of aerial portions. In these also the young growing leaves could be grafted at their growing points. The first impulse to union was found to proceed from the stalk. Monocotyledons, it was found, could be grafted in regions where cells were still capable of division.

**Heat evolution by wounded plants, H. TIESSEN** (*Beitr. Biol. Pflanz.*, 11 (1912), No. 1, pp. 53-106, pls. 2, figs. 13).—The author studied the thermal effects following the wounding of potatoes, apples, radishes, carrots, and beets.

The wounding of tissues was followed by a rise of temperature which was greatest immediately at the wounded surface. The duration of this phenomenon varied between one-half and 3 days, the elevation of temperature ranging from 0.02 to 0.08° C. with an average of about 0.04°. The maximum elevation was reached on an average in 1 hour after wounding (in extreme cases from 15 minutes to 3 hours thereafter). The details of the phenomenon were found to vary for different classes of objects studied. Objects of the same kind under conditions exactly alike exhibited individual differences as regards heat response to wounding, while halves of the same object invariably showed no differences in this respect.

**Arsenic in some parasitic or parasitized plants, F. JADIN and A. ASTRUC** (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 4, pp. 291-293).—The results of the authors' analyses, carried out with 19 parasitic and 12 host plants, are considered to justify the following conclusions:

Parasitic plants on hosts growing directly in the soil contain normally a certain quantity of arsenic. Mistletoe, though found growing in unlike regions and on very different kinds of trees, uniformly contains practically the same proportion of arsenic, although the host plants may show an appreciable difference in this respect. It has not been found possible to establish a proportion between the arsenic content of the parasite and that of its host.

**Some quantitative determinations of manganese in plants, F. JADIN and A. ASTRUC** (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 6, pp. 406-408).—Continuing the above studies, the authors present their findings as to manganese.

They find this constantly present in plants, thus explaining wholly or in part the origin of this element in the animal organism. The chlorophyll-bearing parts of the plant appear to have more manganese than the underground portions. In case of a plant rich in chlorophyll, such as mistletoe, manganese was found to vary greatly from causes not yet ascertained.

**Variations in the proportion of nicotine in different organs of the tobacco plant during its vegetative period, E. CHUARD and R. MELLET** (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 4, pp. 293-295).—Analyses were made of leaves, stems, roots, suckers, and buds of tobacco plants taken on July 14, August 9, September 18, and November 4.

It was found that the nicotine content in the leaves, stems, and roots increased rapidly during the first period; that in leaves increased little during the second and not at all during the third period; while in stems and roots it declined steadily after August 9. In the shoots it reached a maximum September 18. In the tips it did not increase after July 14.

**The influence of tobacco smoke on plants, H. MOLISCH**, (*Sitzber. K. Akad. Wiss. [Vienna]*, *Math. Naturw. Kl.*, 120 (1911), I, No. 7, pp. 813-833, figs. 4).—Continuing work previously noted (*El. S. R.*, 27, p. 254), the author reports more fully on the effects of tobacco smoke on plants, as follows:

Micro-organisms were quickly injured or killed by tobacco smoke. Plants showed great differences in their mode of reaction thereto. *Tradescantia virginiana*, *Salvinella martensii*, *Tolmiea menziesii*, *Eupatorium adenophorum*, species of *Echeveria*, etc., suffered little injury or check from tobacco fumes of

moderate density. On the other hand, some showed themselves very sensitive either (1) by chemotactic movements, as *Bahmeria utilis*, *B. polystachya*, *Impatiens parviflora*, and *Parietaria officinalis*; (2) by anomalous development of lentils, as *Goldfussia glomerata*, *Salvia rubra*, and *Sambucus nigra*; (3) by fall of leaves, as in case of *Mimosa pudica* and others; or (4) by limitation of anthocyanin-formation in *Strobilanthes dyerianus*.

A case of chronic poisoning of fruit trees by factory smoke, R. NASINI, G. CUBONI, and O. MATTIROLO (*Perizia Giudiziaria*, Torino, 1911, pp. 82+3; rev. in *Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 1045-1049).—This is a study of the cumulative effects on the sweet orange (*Citrus sinensis*) of poisoning by sulphur dioxide in factory smoke. Details of the injuries are given, also recommendations for the protection of the trees.

#### FIELD CROPS.

The Woburn field experiments, 1910, J. A. VOELCKER (*Jour. Roy. Agr. Soc. England*, 71 (1910), pp. 322-343).—This continues work previously noted (E. S. R., 23, p. 632). The season of 1910 was unfavorable, the land wet and cold, and germination much delayed.

On the plots on which wheat and barley have been grown continuously the thirty-fourth year's yields on the check plot averaged 14.1 and 13.5 bu. per acre, respectively, as compared with 25.1 and 11.7 bu. after rape dust equivalent to 25 lbs. of ammonia; 24.1 and 20.3 bu. after mineral manures and sulphate of ammonia equivalent to 25 lbs. of ammonia on the plots to which 1 ton of lime had been added in 1905; and 27.8 and 31.5 bu. after mineral fertilizers and nitrate of soda equivalent to 50 lbs. of ammonia.

In rotation tests, the plot of swedes fed off by sheep that received decorticated cotton cake in addition produced a little more barley than the check plots, but the plot on which sheep were fed corn meal produced the lowest barley yield in this portion of the test. When cattle were similarly fed, there was little difference in yield on the cotton cake and corn meal plots, but each produced 4 or 5 bu. more than the check plots. In another rotation, the wheat yield following mustard during the fourth year after the cotton cake and corn meal had been fed on the land indicated that the residual effects of the manure had been practically exhausted by this time. With a third rotation, using sheep, the yield of swedes after wheat was somewhat lower on the corn and cotton cake plots than on the check plots, but with cattle the swede yield was about 2½ tons per acre greater on the cotton cake plot than on the check plots, while the corn-meal manure apparently gave no profit. In a fourth rotation, mustard after barley gave a lower average yield on the corn meal and cotton cake plots than on the check plots.

Mustard and rape plowed under as green manures were followed by much higher wheat yields than were vetches and each of the three was followed by a considerably higher yield when plowed under with lime than with mineral manures. This difference in favor of lime had not been noted in the earlier years of this test and may be due to the depletion of the lime content of the soil. The indication of the superiority of mustard as green manure, however, is in harmony with the results of earlier experiments.

In 1910, as in each of the 4 previous years of the test, a Canadian alfalfa seed gave markedly higher yields than did two other varieties designated as Provence and American.

An application of 2 tons of lime was followed by a yield of 38.1 bu. of wheat as compared with 37 bu. on the no-lime plot, and 42.1 bu. on the plot which received 10 cwt. of ground lime in 1907 and the same amount in 1909.

In a test of nitrogen sources for oats, each applied in quantities supplying the amount of nitrogen contained in 1 cwt. of sulphate of ammonia, a wheat yield of 1,916 lbs. was obtained after the use of calcium cyanamid; 1,812 lbs. after calcium nitrate; 1,779 lbs. after nitrate of soda; and 1,771 lbs. after sulphate of ammonia, as compared with 1,572 lbs. on the check plot.

In another test of nitrogen sources, each applied in amounts supplying the same amount of nitrogen as that contained in 1 cwt. sulphate of ammonia, and each accompanied by a so-called standard dressing consisting of 12 tons of dung, 8 cwt. of superphosphate, 1 cwt. sulphate of potash, and 2 cwt. salt, a yield of 29 tons 3½ cwt. of mangels was secured after the use of sulphate of ammonia, 34 tons, 15 cwt. after nitrate of soda, 36 tons 16½ cwt. after calcium nitrate, 35 tons 15½ cwt. after calcium cyanamid, and 33 tons after soot. From this test the author concludes that calcium cyanamid and calcium nitrate appear to equal or excel nitrate of soda as fertilizers for mangels. The planting of mangels on plots to which these nitrogen sources had been applied the previous year indicated "that the residue left over for a second crop was in no instance of material value."

In a test of 10 wheat varieties, the Dutch variety *Wilhelmina* produced a much higher yield than any other tested but was poor in strength, while *Red Admiral* produced a much higher yield than any other English or French variety tested. Two Cambridge varieties designated as No. 1 and No. 2 excelled the others in quality but No. 2 was the lowest yielding variety tested.

In a meadow fertilizer test an application of 10 cwt. of basic slag and 1 cwt. of sulphate of potash per acre was followed by a yield of 1 ton, 15½ cwt. of hay per acre as compared with 1 ton, 18½ cwt. after 12 tons of farmyard manure and smaller yields after other mixtures of superphosphate, basic slag, nitrate of potash, and sulphate of potash in various mixtures. The hay containing the highest percentage of legumes and the lowest percentage of grasses followed an application of superphosphate and sulphate of potash, while the lowest percentage of legumes and the highest percentage of grasses was obtained from the no-manure plot.

The Woburn field experiments, 1911, J. A. VOELCKER (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 387-403).—This continues the work noted above. The prolonged drought of 1911 was especially severe on the grain crops on this light sandy soil.

On the plots on which wheat and barley have been grown continuously, the thirty-fifth year's yields of these 2 crops on the check plots averaged 82 and 2.6 bu. per acre, respectively, as compared with 20.2 and 26.7 bu. after farmyard manure equivalent to 100 lbs. of ammonia; 21.8 and 3.8 bu. after nitrate of soda equivalent to 50 lbs. of ammonia; 21.6 and 1.7 bu. after half this amount of nitrate of soda; and 20.2 and 6.2 bu. after 1 cwt. of sulphate of potash and nitrate of soda equivalent to 25 lbs. of ammonia. On the wheat plots an application of sulphate of ammonia equivalent to 25 lbs. of ammonia was followed by a yield of 1.4 bu. as compared with 19.1 bu. after the same amount of sulphate of ammonia supplemented by 5 cwt. of lime in January 1905, repeated in 1909 and 1910. These same fertilizers, and superphosphate and rape dust singly and in various mixtures and amounts were also applied to 14 other plots.

A high yield of grain and straw was obtained from a wheat plot fertilized with the manure from corn-fed cattle than in case of the check plots or a plot fertilized with the manure from cattle fed on decorticated cotton cake. On land on which the previous year's swede crop had been consumed by sheep which were fed corn on the plots, the wheat yield was 2 cwt. and the straw yield over 3½ cwt. greater than on the plot where the swede crop had been

consumed by cake-fed sheep. The cake-fed sheep received chaff and equal parts of linseed and undecorticated cotton cake, while the grain-fed sheep received chaff and equal parts of barley and oats in addition to the swedes.

In a test of nitrogenous top dressings supplying the amount of nitrogen contained in 1 cwt. of sulphate of ammonia, a wheat yield of 1,240 lbs. followed nitrate of soda as compared with 1,023 lbs. after nitrate of lime, 1,016 lbs. on the check plot, 959 lbs. after sulphate of ammonia, 1,061 lbs. after calcium cyanamid, 1,174 lbs. after a mixture of equal parts of nitrate of lime and cyanamid, and 1,078 lbs. after a mixture of one part of nitrate of lime and two parts of cyanamid. The author regards the mixing of these two materials as distinctly satisfactory.

In a test of alfalfa varieties designated as American (Arizona), North American, Canadian, Turkestan, Provence, Russian (Europe), and Russian (Asia), "the two that stood out undoubtedly the best were the two American varieties."

The cost per acre of hoeing, thinning, and harvesting sugar beets planted 12, 15, and 18 in. apart was 86s. 6d., 70s. 6d., and 58s., respectively, as compared with 24s. 6d. in case of mangels planted 24 in. apart. The yields in the same order were 21 tons 1 cwt., 22 tons 13 cwt., 23 tons 15 cwt., and 44 tons 4 cwt.

Although the conclusions are deemed only tentative, it appeared that Buxton lime and chalk lime excelled lias, oolite, and magnesian limes for grass.

Report of Hedemarken County Experiment Station, 1911, W. CHRISTIE (*Ber. Hedemarkens Amts Forsöksstat. Virks.*, 7 (1911), pp. 56, pls. 2, figs. 2).—Tests of potato varieties, planting potatoes of different degrees of maturity, fall growth of potatoes, and changes occurring after harvest, dates of sowing winter rye, and the use of Thomas phosphate, nitrate of soda, and kainit as top-dressing for meadows are included in this report. The work on meadows and winter rye has extended over a period of years.

[Field crops at the Roseworthy Agricultural College], A. J. PERKINS and W. J. SPARROW (*Jour. Dept. Agr. So. Aust.*, 14 (1911), Nos. 10, pp. 959-967; 11, pp. 1030-1037; 12, pp. 1141-1154; 15 (1911), Nos. 1, pp. 10-25; 2, pp. 112-119).—This is the fourth report (E. S. R., 23, p. 535). Meteorological data and a general discussion of 6 years' results are followed by a statement of the results obtained in 1909-10 and 1910-11.

Rotation tests were conducted to determine whether or not local farming was possible except under the bare fallowing system now practiced. When wheat was grown continuously the yield fell from 29 bu. 19 lbs. per acre the first year to 9 bu. 15 lbs. the second year, and 3 bu. 53 lbs. the third year. In the second and third years these yields were 11 and 12 bu., respectively, below the averages of those secured after bare fallow. The hay yields were about a ton below the averages on the bare fallow plots during each of the 2 years. In a 2 years' test comparing bare fallow with (1) a turnip, barley, pea, wheat, and (2) a kale, oat, vetch, wheat rotation, the advantage in grain yield on the bare fallow was more than sufficient to pay the rental costs of idle land. During other years this difference was insufficient, and in one case the difference was nearly 3 bu. in favor of wheat grown in rotation. In hay yields the wheat grown in rotation averaged much better than that grown after bare fallow. In another rotation the returns of wheat after sorghum did not approach those secured from wheat after bare fallow. The authors conclude that under the conditions during these tests a year of bare fallow is not essential in growing wheat for either hay or grain.

In the turnip, barley, pea, wheat, rotation during 4 years, the turnips maintained the equivalent of 3.16 sheep per acre for an entire year. Similarly an



acre of barley maintained 0.94 sheep per acre per year, peas, 2.23, and wheat 0.39. In the kale, oat, vetch, wheat rotation the figures were 2.41, 0.50, 2.09 and 0.52 sheep per acre per year, respectively. The total gross returns for the two 4-year rotations were £12 4s. 1d. and £12 13s. 6d., respectively, as compared with £10 15s. after bare fallow. The increased gross return was not sufficient to cover the additional outlay involved in raising the subsidiary crops.

Three years' work indicated that in point of cereal returns a bare-fallow, wheat rotation had every advantage over a bare fallow, wheat, pasture rotation, although the net returns from the longer rotation "are likely to be quite as good if not better."

Four years' tests indicated that the average sheep-carrying capacity of pasture plats after wheat, treated with  $\frac{1}{2}$  cwt. of superphosphate, was 2.66 sheep per acre per year, as compared with 3.01, 3.09, and 3.26 head, respectively, in case of plats that received 1, 2, and 3 cwt. of superphosphate per acre. These heavier applications apparently gave a carrying capacity about 4 or 5 times as great as that "of similar land worked on ordinary station lines." In case of wheat, the heavier applications of superphosphate did not produce profitable increases in yield.

On unfertilized plats the period between germination of wheat and full bloom averaged 135 days and that between germination and ripening 180 days, as compared with 130 and 178 days on the superphosphate plats, and 126 and 173 days on the nitrate of soda plats. Although nitrate of soda apparently increased the grain and hay yields, the increases were insufficient to pay the cost of the fertilizer.

In a 5-year test applications of 2 cwt. of superphosphate either with or without  $\frac{1}{2}$  cwt. of nitrate of soda to wheat were followed by somewhat greater grain yields than were 2 or 3 cwt. of basic slag or 14 tons of farmyard manure per acre. In a 1-year test of fertilizers after bare fallow a higher wheat yield followed an application of 2 cwt. of superphosphate and  $\frac{1}{2}$  cwt. of sulphate of potash than was secured on any of 14 other plats in the test, which received applications of superphosphate with or without sulphate of potash, sulphate of ammonia, nitrate of soda, or muriate of potash in various mixtures and amounts. Eleven of these plats had been seeded continuously to wheat and decreased in average yield from 26 bu. 10 lbs. in 1905 to 5 bu. 23 lbs. per acre in 1907. In 1908 they were bare fallowed and in 1909 averaged 35 bu. and 34 lbs. of grain per acre.

[Small grain experiments at the Roseworthy Agricultural College], A. J. PERKINS (*Jour. Dept. Agr. So. Aust.*, 15 (1912), Nos. 7, pp. 705-713; 8, pp. 792-800).—These pages state the results of variety tests of oats, wheat, and barley on six 1-acre plats plowed from 2 to 12 in. The highest wheat yield was obtained from the plat plowed 8 in. deep.

[Depth of sowing tests], A. J. PERKINS and W. J. SPAFFORD (*Jour. Dept. Agr. So. Aust.*, 15 (1911), Nos. 3, pp. 203-216; 4, pp. 353-362; 5, pp. 473-488; 15 (1912), No. 6, pp. 608-623, Ag. 1).—Tables state in detail the germination secured by sowing at 12 different depths ranging from  $\frac{1}{2}$  in. to 6 in. during the 3-year period, 1906-1909. The seeds were generally planted on duplicate plats in sandy soil and in a heavy clay loam, and not all were sown throughout the 3-year period.

Wheat germinated most freely in sandy soil when sown from  $\frac{1}{2}$  in. to 1 in. deep, and fairly satisfactorily up to 4 in. but beyond that depth germination was irregular, although 50 per cent of the plants finally came up even after sowings 6 in. deep. In heavy clay loam, germination was best at a depth of 1 in. but continued fairly satisfactory to a depth of 2 $\frac{1}{2}$  in., while below 4 $\frac{1}{2}$  in. more than 50 per cent was lost.

In light sandy soil from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. appeared to be the best depth for sowing barley, although satisfactory results were obtained at depths of 4 in. beyond which a greater proportion of the plants died back. In heavy clay loam from  $\frac{1}{2}$  to  $2\frac{1}{2}$  in. appeared to be the normal depth of planting, and the highest yields of grain were secured from sowings between 1 and 2 in. deep.

Oats in light sandy soil germinated best at depths between  $1\frac{1}{2}$  and  $2\frac{1}{2}$  in., but might be planted 4 in. deep without much danger of serious loss from faulty germination. About three-fifths of the seed sown germinated successfully at a depth of 6 in. The germination of oats sown from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. deep took place between the tenth and thirtieth days after sowing, as compared with the ninth and eighteenth days for barley, and the tenth and twenty-first days for wheat sown at similar depths. In heavy clay loam from  $1\frac{1}{2}$  to 2 in. appeared to be the best depth of sowing for oats, but fully three-fourths of the seed sown  $5\frac{1}{2}$  in. deep germinated successfully. The proportion of plants dying back increased steadily at depths greater than 4 in.

One year's tests indicate that on sandy soil field beans and peas will give a germination of from 90 to 100 per cent at all depths between  $\frac{1}{2}$  in. and 6 in.

From 2 years' work it was not possible to state in figures a depth of planting corn that would be applicable to all cases. Shallow planting appeared likely to result in late and irregular germination depending almost entirely upon the rains following planting.

For sorghum about 1 in. appeared to be the best depth of sowing if sufficient moisture in the surface soil layer could be relied upon. Under ordinary circumstances, however, sowing from 1 to 2 in. deep in heavy soils or from 2 to  $2\frac{1}{2}$  in. deep in light soils, and in case of late seeding even deeper sowings, are recommended. Millet should not be sown more than 1 in. deep on heavy land or  $1\frac{1}{2}$  in. on light soil.

[Fertilizer tests on meadows], G. BREDEMANN (*Fühling's Landw. Ztg.*, 61 (1912), Nos. 5, pp. 166-191; 6, pp. 210-229).—A brief summary of earlier work is followed by statements of the results of fertilizer tests on meadows extending over a considerable period of years at each of a number of German experiment stations. The fertilizer mixtures applied were (1) Thomas meal and kainit; (2) Thomas meal, kainit, and every fourth year quicklime, and (3) Thomas meal, kainit, and every fourth year a double application of quicklime. Mechanical and chemical analyses of the soils of each of the stations are given.

Cooperative experiments with alfalfa, M. F. MILLER and C. B. HUTCHISON (*Missouri Sta. Bul.* 106, pp. 23-56, figs. 8).—The experiments here reported, begun in 1907, were increased in number from year to year and finally furnished data from 74 of the 114 counties of the State. Each cooperator was instructed to devote 1 acre to the test and to divide this into 4 equal plats. The first plat was to receive 12 tons of manure per acre, the second 3,000 lbs. of lime, the third 300 lbs. of steamed bone meal, and the fourth was to receive no soil treatment. Two-thirds of each plat was to be inoculated and one-half of the inoculated portion given cultivation with a disk or spring-tooth harrow. The results of the individual experiments as well as summaries based on the soil types and the soil treatment are given in tables and discussed.

The data secured in this cooperative work indicated that alfalfa does not have as wide adaptations as most forage crops grown in the State. The most important factors in the success of the crop were drainage, the character of the subsoil, the fertility, and the quantity of lime carbonate present. The well-drained silt and sandy loam bottom lands with porous subsoils proved to be the best alfalfa lands of the State. On upland soils the best results were secured on the fertile, rolling prairies of the north and west central part, the

better timbered lands of north Missouri, and the more fertile valley lands of the Ozark region. The number of failures was largest on the level prairie lands.

The application of manure was found beneficial\* and often necessary in securing a satisfactory stand on most upland soils. The use of bone meal on the upland soils, which are mostly lacking in available phosphates, appeared profitable. Most of the soils of the State adapted to alfalfa growing are well supplied with lime carbonate and hence lime did not usually give profitable returns. In most cases inoculation of the soil was found beneficial or necessary, and cultivation of the crop with the disk or spring-tooth harrow was found effective in preventing the growth of grasses during late summer.

Alfalfa seed production, R. W. THATCHER (*Washington Sta. Popular Bul.* 42, pp. 4).—Cooperative work of the station and this Department in the production of alfalfa seed is briefly reported.

Thinning experiments carried on in this connection showed conclusively that a much better yield of seed may be obtained from a thin than from a dense stand of alfalfa, but the work is to be continued. From the results of some of the experiments, as well as observations made in another connection, it appears probable that with proper thinning large crops of seed may be secured.

The development of the grain of barley, WINIFRED E. BRENCHEY (*Ann. Bot. [London]*, 26 (1912), No. 103, pp. 903-928, figs. 22).—Pursuant to previous studies on the development of the grain in wheat (*E. S. R.*, 24, p. 37), the author investigated samples of barley from plants so selected as to show the results obtained (1) from a nitrogenous general manuring, (2) a rotation without any addition of manure, and (3) phosphoric acid starvation in the presence of a sufficiency of nitrogen and of potash and other alkalis. The results may be summarized as follows:

The weight of the plant as a whole, also of the nitrogen, phosphoric acid, and ash, increase until desiccation begins about 3 weeks before harvest. After this the ash decreases somewhat, while the nitrogen and phosphoric acid continue fairly constant. The phosphoric acid-starved plant, in case of barley, showed somewhat abnormal results, especially in the analysis of the straw. During the longer desiccation period of barley certain maturation changes are evident which are hardly noticeable in wheat, which is cut earlier in its development. The infiltration of starch progresses from the chalazal end toward the embryo. As the barley grain develops, nuclear changes appear, thought to be due to pressure from increase of starch. The nuclei lose their nucleoli and become deformed progressively from both ends of the grain toward the middle, the last cells involved being those of the subaleuronic layer of the endosperm.

[Clover tests in Denmark], E. LINDHARD (*Tidsskr. Landbr. Planteavl.*, 19 (1912), No. 1, pp. 1-43).—The experiments reported include variety and rate of seeding tests conducted at Danish experiment stations with alsike clover, white clover, yellow trefoil, and kidney vetch. Seed grown in various countries was also tested.

Increasing the yield of a strain of Reid yellow dent, J. R. HALL (*Col. Farmer [Univ. Missouri]*, 9 (1912), No. 4, pp. 7, 8, fig. 1).—The author summarizes some results of Williams and Welton already noted (*E. S. R.*, 23, p. 37):

From his own experiments he concludes that it is impossible to detect the highest yielding ears of seed corn by inspection, but he states some indications of high yielding power. In a 2 years' test the ears over 9 in. averaged 3.08 bushels higher yields than those under 9 in. in length. Cylindrical ears yielded 1.5 bushels per acre more than tapering ears, moderately smooth ears yielded 2.8 bushels

more than moderately rough ears, and heavy ears showed an average advantage of 2.9 bu.

Mendelian inheritance in cotton hybrids, C. A. MCLENDON (*Georgia Sta. Bul.* 99, pp. 159-228, figs. 27).—This bulletin is a report of progress on experiments in cotton breeding conducted for 3 years and including only the second generation of the first crosses made.

The varieties and types entering into this work were Willet Redleaf, Cook Bigboll, Hastings Bigboll, Pride of Georgia, Toole, Sistrunk, Russell Bigboll, Cleveland Bigboll, Ratteree Favorite, Blue Ribbon, and Sea Island. From a trial plot planted with commercial seed of the different varieties the parent stock was selected on the basis of superiority and general appearance. Several series of crosses were made in each instance and when the progeny of the parent plants and the  $F_1$  generation of the crosses were grown, all of the series except those from parents showing their purity were eliminated. Six series of crosses were made the first year and 3 additional series the second between varieties of tested purity. The methods employed are described in detail, particular attention being given to crossing and selfing. The inheritance of characters is discussed and tables are given showing the dominant and recessive characters, together with the ratio of segregation. A list of 37 allelomorphic pairs of unit characters in the cotton plant is presented and a bibliography of 28 references on Mendelian inheritance and natural crossing in cotton is appended.

The results of 2 experiments conducted on a limited scale showed that natural crossing occurs, but that most if not all insects causing it may be excluded from the plants by means of netting.

It is concluded from the results secured that the heritable characters in the crosses studied seem to obey Mendel's laws of dominance, segregation, and recombination. Dominance was found incomplete for several characters which rendered the heterozygote intermediate and gave a greater range of visible variation in crosses having two or more characters correlated. Segregation into the 1:2:1, 3:1, 9:3:3:1, and 15:1 ratios was indicated in these experiments, but the exact theoretical proportions occurred in only a few instances, this being considered due either to the small number of individuals or the heterozygous condition of the parent stock. Intensification of the characters in crosses between Sea Island and Upland varieties was very common in the  $F_1$  generation, but in the succeeding generations it gradually diminished. Fluctuation was infrequent in pure strains but very common in lint characters, even in apparently homozygous individuals. Variations of economic importance were of frequent occurrence, but they were usually if not always the result of crossing.

Fertilizer tests of oats, F. GAUL (*Illus. Landw. Ztg.*, 32 (1912), No. 10, pp. 75, 76).—Tables report the results of a number of years' tests of ammonium sulphate, nitrate of soda, nitrate of lime, Thomas meal, and kainit singly or in various mixtures as fertilizers for oats in Thuringia.

From the data presented the author concludes that on light dry soil, ammonium sulphate harrowed in at the time of planting proved the best nitrogen fertilizer for oats. Thomas meal and kainit gave no profits when applied to oats after winter grain, but may be used when oats are a nurse crop for clover. Kainit and a 40 per cent potash salt may be used on a heavy soil that tends to the formation of a crust.

The influence of different amounts of water on the yield and quality of sugar beets, A. HENKE (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 41 (1912), No. 1, pp. 1-7).—Analyses of beets grown in concrete and other pots, to which water was applied at 3 different rates each year, are reported in tabular form. Parallel series of experiments were conducted on 3 different soils.

Other tables report the amount of water used per kilogram of plant substance produced by the plants.

The total nitrogen content in the roots decreased as the amount of water applied increased, but probably no less nitrogen was absorbed by the large heavily watered beets, as the nitrogen rose to the foliage in this case. The decrease in the total nitrogen content was even more rapid than the increase in the amount of water applied, and the quality of the beets was improved. This is in harmony with the common observation that during dry seasons the injurious nitrogen content is high.

The composition of sugar beets of different sizes, A. HERKE (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 41 (1912), No. 4, pp. 8-12).—Each of a number of lots of beets was sorted, on the basis of weight, into 3 groups. 4 Tables show the chemical composition of the beets in each group.

Soaking beet seed, G. KÖCK (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, 41 (1912), No. 1, pp. 13-15).—Soaking beet seed 20 hours in pure water gave a quicker, more even germination, healthier and more vigorous plants, and heavier beets. The results of treating with 0.5 per cent carbolic acid are also briefly reported.

The germination of hulled timothy seed, B. KAJAMUS (*Fühling's Landw. Ztg.*, 60 (1911), No. 12, pp. 431-434).—Tests of 19 samples grown during the year preceding the test showed an average germinating power of 93 per cent for the seed without hulls, and 97.5 per cent for that with hulls. In case of a poorly stored sample the tests were 61.3 and 64.3 per cent, respectively. This seed was probably immature. In another group the author includes 6 samples in which the seed with and without hulls showed average germination tests of 79.5 and 42.9 per cent, respectively. He concludes that storage affects more quickly the seeds which have lost their hulls, and that they are more subject to mold. Their metabolic processes are hastened and the germ dies more quickly.

Tobacco: Breeding cigar filler in Ohio, A. D. SELBY and T. HOUSEY (*Ohio Sta. Bul.* 239, pp. 361-479, figs. 30).—This bulletin, continuing previous work (*E. S. R.*, 27, p. 237), states the conditions surrounding tobacco improvement in the Ohio tobacco filler district, and records the results in producing new types by selection and hybridization at the Germantown test farm in cooperation with the Bureau of Plant Industry of this Department. The theory and practice of hybridization and tobacco breeding are discussed in detail and the more important hybrids originated in this work are described.

The selection of individual seed plants of Zimmer Spanish resulted in no progress toward a better quality or a higher yield, and indicated that improvement was possible only by the method of crossing followed by selection. In 1906, plants from seed 15 years old and which germinated nearly as well as new seed did not differ in character or yielding capacity from other Zimmer Spanish tobacco grown. In 1910, old seed claimed to have passed through but 2 generations since the original supply had been obtained from the supposed originator of the variety, produced less than the checks grown with it, and the tobacco again appeared exactly like the ordinary Zimmer Spanish of to-day. These results are believed to disprove the claim that the variety is running out.

Results obtained in 4 different years with Zimmer Spanish. These results were also regarded as showing a remarkable fixity of type in which even radical changes of environment do not produce inheritable variation.

In 1906, Ohio Seedleaf and Pennsylvania Seedleaf in a comparative test yielded 44.6 and 40.6 per cent more respectively than Zimmer Spanish. For the 4 years 1907-1910, selections of Pennsylvania Seedleaf, numbered 9 and 12, pro-

duced an average gain per acre over Zimmer Spanish of 428 lbs., or 43.9 per cent, and 482 lbs., or 52.1 per cent, respectively.

Experiments with the Cuban variety indicated that considerable improvement in yield and in the reduction of suckers is possible through selection. By this means, the yield was increased from slightly over one-half to more than three-fourths of the yield of Zimmer Spanish. As the yielding capacity of the variety is so low, no practical results were obtained. Under the conditions existing in the Miami Valley district, this variety undergoes a marked breaking up in type, but the range in variation was not found so great as in hybrids between radically different varieties.

Hybridization work was begun at Germantown in 1903 by making 26 distinct crosses between Connecticut Seedleaf and Cuban varieties. In 1904, crosses were made between these first hybrids and Ohio Seedleaf and Zimmer Spanish, together with one each between Zimmer Spanish and Ohio Seedleaf and Zimmer Spanish and Cuban. The next year a large number of crosses were made between Cuban, Zimmer Spanish, Ohio Seedleaf, and several hybrids already made in divers combinations. Since that time, new hybrids have been made each year, among them a number whose parents were both of Seedleaf type.

The hybrids are arranged in 4 groups of which the first includes the Havana or Spanish types, more or less closely approaching Zimmer Spanish, the second contains the Seedleaf class, the third those intermediate between Seedleaf and Spanish, and the fourth the Cuban and Connecticut Seedleaf hybrids. Of the 26 hybrids between Cuban and Connecticut Seedleaf made in 1903, only 5 were retained as worthy of propagation. The variation in this lot of hybrids was extreme, and in the second generation it was so great that no 2 plants of sufficient individual merit to warrant propagation bore any considerable resemblance to each other.

The individual annual records of the important members of each group of hybrids are summarized in tables. A comparison of yields of 24 hybrids and 8 varieties presented a general increase in the relative yields of the hybrids during the 3 years 1908-1910. The average increase per acre over Zimmer Spanish for all hybrids in 1908 was 189 lbs., in 1909 227 lbs., and in 1910 405 lbs.

Experiments to determine the possibility of growing tobacco crops as first-generation hybrids were carried on during several seasons. Zimmer Spanish was selected for determining the effects of cross-fertilization within the limits of a fixed variety. The average of all results gave a gain of only about 25 lbs. per acre in favor of cross-fertilization. The lack of variation in Zimmer Spanish, or its fixity of type, is given as a possible explanation of this result. In 1907, pairs of plants of distinct varieties were selected and 2 lots of seed from each plant, one arising from self and the other from cross-fertilization, were secured. The results of this seed from 8 plantings for each pair of parent plants showed that in all cases the hybrids exceeded in yield not only the average of their parents but also their more productive parents. The minimum increase per acre was 67 lbs., while the maximum was 285 lbs., and the average 165 lbs. In 1908, 39 new hybrids were tested in a similar way with their parent plants. These hybrids, in most cases produced considerably more than the parental average, but a number of them failed to reach the yield made by the more productive parent. This year the hybrid yields ranged from a minimum of a decrease per acre of 160 lbs. to a maximum of an increase of 492 lbs., the average of the hybrids being about 185 lbs. greater per acre than that of their parent plants. In discussing the relation of parental yields to that of hybrids, the authors state that in many instances they have been able to produce in the third and later generations yields much in excess of the yield of the first gen-

eration. They report their failure to produce a first-generation yield equal to the combined yield of both parents, which was accomplished several times in later generations. In reviewing the possibility of producing first-generation hybrids on a commercial scale, it is estimated that the extra cost should not exceed 50 cts. per acre.

A study of certain strains of some of the hybrid varieties indicated the possibility of breeding for special adaptations. Among the hybrids produced some exhibited great drought resistance and others a much greater ability to make profitable use of the less available or more slowly available forms of plant food such as barnyard manure or other forms of organic matter and certain ingredients often found in commercial fertilizers.

Cooperative tests by farmers were conducted in 1900, 1910, and 1911. In 1910, Hybrid 81 was given out for the first time and immediately found favor with many growers on account of its erect habit of growth, hardiness, and great ability to withstand windstorms. In yield it made from 13 to 46 per cent more than Zimmer Spanish under the same conditions. The cured tobacco of this hybrid is almost undistinguishable from that of Zimmer Spanish, and its smoking quality has proved equal to or better than that of Zimmer Spanish. It is stated that the total number of cooperative growers for 1912 is about 100 and that the total acreage of hybrids to be grown in these tests will amount to over 250 acres planted largely to Hybrids 81, 224, and 199. Hybrids 81 and 224 of the Spanish types, Hybrid 199, a Seedleaf type, and Hybrid 110, which is intermediate in character, are especially recommended for trial.

Smoking tests of Ohio filler tobacco are reported and discussed. It was found that there was no apparent connection between nicotin content and smoking quality.

The influence of superphosphates on the germination of wheat, A. J. EWART (*Jour. Dept. Agr. Victoria*, 10 (1912), No. 4, pp. 256-258).—The author notes that it has frequently been stated that the germination of wheat may be easily affected if it lies long in contact with superphosphate of lime in a dry soil. The injury is pronounced only when the seed germinates and the soil subsequently dries.

Seeds stored dry with an equal quantity of dry superphosphate gave germination tests averaging 91.25 per cent at the end of 3 weeks, and 87 per cent at the end of 6 weeks, as compared with 91 per cent at the end of 3 weeks in case of the seed stored without superphosphate. The author concludes that little or no injurious effect is exercised under these conditions in a moderate length of time.

In a field test, superphosphate was applied with the grain 1 in. deep, 1 in. below the seed and 3 in. below the seed. The deeper plantings were invariably followed by considerably greater yields.

Wheat experiments, season 1911, H. ROSS ET AL. (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 4, pp. 277-293).—These pages report the results of farmers' variety tests of wheat in 4 different districts, fertilizer and smut prevention tests, and trials of mixed sowings of wheat and oats for hay.

Seed laboratory report for 1910 and 1911, W. L. OSWALD (*Minnesota Sta. Bul.* 127, pp. 129-163, pls. 2, figs. 12).—Following introductory remarks on the objects of the Minnesota seed laboratory by E. M. Freeman, the bulletin describes methods of seed testing employed, reports the source of the seed samples received, presents results of purity and germination tests, and describes a weed-seed case for the identification of weed seeds.

During the 2 years, 2,275 tests for purity were made. It was found in the work that out of a total of 59 different weed seeds found, 36 occurred in the different samples of medium red clover. Only 4 different varieties were found.

in rye. The seeds of lamb's quarters and pepper grass appeared in 14 of the 16 crop seeds examined, while dodder seed appeared only in alfalfa and red clover. Green foxtail and lamb's quarters were the most common weed seeds found. Of the millet samples examined, 96.2 per cent contained green foxtail seed. A large number of all samples tested were below the standard of purity.

On the average, all germination tests gave a higher average in 1911 than in 1910. Brome grass had a very low percentage of germination. The average germination of hard seeds in alfalfa was 16.125 per cent, in medium red clover 10.45 per cent, in mammoth clover 6.5 per cent, in white clover 19.41 per cent, and in alsike clover 12.55 per cent. Some tests of alfalfa at the laboratory showed from 50 to 75 per cent of hard seeds.

The approximate number of various crop and weed seeds per pound was determined and is reported in tables.

[Seed analyses and experiment station results], F. G. STEBLER (*Landw. Jahrb. Schweiz*, 25 (1911), No. 5, pp. 149-170).—These pages report the results of purity and germination tests of the seeds of legumes, grasses, grains, fiber crops, root crops, and forest trees at the Zurich Seed Control Station. They also give a brief report of other work under way (E. S. R., p. 239).

Period of germinability of the seed of *Cuscuta epilinum*, A. HERZOG (*Deut. Landw. Presse*, 39 (1912), No. 27, p. 321, figs. 3).—A table containing the results of annual germination tests of the seed of *C. epilinum*, conducted during the period 1897-1911, indicates that the percentage of the seed which germinated in the first 5 days of the test gradually decreased from 90 in 1897 to 4 in 1906, and that the seed appeared to be entirely dead during 1910-11.

## HORTICULTURE.

Report of the horticulturist, C. F. KINMAN (*Porto Rico Sta. Rpt. 1911*, pp. 24-27, pls. 3).—A progress report of the year's work with fruits, vegetables, and miscellaneous plants (E. S. R., 25, p. 740).

In the cooperative fertilizer experiments with citrus fruits the complete fertilizers continued to give the best results. A study of the navel oranges growing in Porto Rico indicates that there is a great variation in regard to the quality of the fruit. Material has been collected from different orchards on the island and experiments to determine the cause of variation in quality are under way. The evidence in some cases indicates that this difference is due to bud variation.

Experiments in fumigating young pineapple plants taken from fields badly infested with mealy bugs have shown that a fumigation strong enough to assure clean plants at setting without injury to the plants can be made. The fumigation, however, has only a temporary effect and the customary practices must be employed in keeping the plants free from insects after they have been set in the field.

The work with cover crops in citrus orchards was extended to pineapple and coconut plantations. Cowpeas, velvet beans, sword beans, and pigeon peas have given good results. Cowpeas were found to be inferior to the other crops for summer planting on heavy soils as they mature early and often at a time when the soil is too wet for replanting or caring for a new crop properly. The other crops mentioned continue their growth throughout the season of heavy rains and make a dense cover that keeps down all the grass and weeds and also serves to prevent soil washing. Good crops of seed were secured from cowpeas planted in the spring, although winter-grown crops of *Canavalia* and velvet beans are more prolific. *Canavalia* and velvet beans planted on low, heavy



land April 10 yielded 12½ tons and 9 tons per acre of vines, green weight, respectively, 94 days from planting.

A study of the degenerating influence of Porto Rican conditions on a number of imported vegetable varieties started 2 years ago indicates that at least the okra and beans have degenerated both in vigor of the plants and productive-ness. Cultural, fertilizer, and variety tests with yautias, dasheens, and yams were continued with good results. Of the yams Potato and Guinea seem to be the most promising in Porto Rico.

A test of several varieties of strawberries imported from the United States indicates that this fruit is poorly adapted to Porto Rican conditions. Of the eucalypts which are being tested in low, heavy lands, *Eucalyptus robusta*, *E. piperita*, and *E. tereticornis* have been the only varieties to make satisfactory growth.

A study of the imported varieties of bananas in the station's plantings shows that there are many duplicates due to the common names used in the countries from which they were sent. The work with mangoes was continued along previous lines.

Report of the government horticultural experimental fields in South Holland for 1911, C. H. CLAASSEN ET AL. (*Verslag Rijks tuinbouwproefvelden Zuid-Holland, 1911*, pp. 96, pls. 2).—This is the usual report for 1911 on co-operative cultural, variety, fertilizer, and spraying experiments with fruits and vegetables conducted at different localities in South Holland (E. S. R., 25, p. 642).

Note on the dipping or warm bath method of forcing plants, S. T. PARKINSON (*Jour. Southeast. Agr. Col. Wye, 1911*, No. 20, pp. 361-366, pl. 1).—Additional tests of the warm bath method of forcing plants (E. S. R., 25, p. 536) are reported. The results on the whole confirm those previously obtained.

The kitchen garden, L. PICHENAUD (*Le Jardin Potager. Paris, 1912*, pp. 294, figs. 89).—A practical treatise on amateur and market gardening. Part 1 deals with the general principles of gardening, garden equipment, etc.; part 2 contains detailed cultural directions for various classes and kinds of vegetables; and part 3 comprises a working calendar for the year.

The production of mushrooms in quarries by the means of a pure culture obtained by a new process, G. BOYER (*Proc. Verb. Soc. Sci. Phys. et Nat. Bordeaux, 1910-11*, pp. 46-50).—The author's method of producing pure mushroom spawn in a sterilized medium is described.

The effect of manganese on pineapple plants and the ripening of the pineapple fruit, E. V. WILCOX and W. P. KELLEY (*Hawaii Sta. Bul. 23*, pp. 20, pls. 2).—The studies reported in this bulletin were undertaken in continuation of previous investigations relative to the effect of manganese on pineapples and of the chemical composition of pineapple fruits in different stages of development (E. S. R., 25, p. 340; 27, pp. 118, 129). In addition to the chemical investigations a microscopic study was made of all the different parts of pineapples for the purpose of learning the structural changes produced by the presence of large quantities of manganese in the soil and the morphological changes which occur in the ripening of the fruit. The authors call attention to the fact that anatomical and chemical findings are in striking harmony.

The root system of pineapples was found to be very variable and particularly sensitive to adverse soil conditions. In manganiferous soils the roots are less extensive and have characteristic swollen tips. These swellings seem to mark the cessation of the lateral growth of the roots, death and decay immediately following their development. The most conspicuous effect of manganese on the plant is seen in the bleaching of the chlorophyll, which first begins to fade. The chloroplasts lose their organized structure, after which the color disappears.

altogether. Calcium oxalate is much more abundant in pineapple plants growing on manganiferous soils. The ash of such plants also contains considerably more lime and less phosphorus pentoxid and magnesia than when grown on normal soils.

The stem of pineapples serves as a repository for starch and contains large amounts of this substance. The leaves, in common with other members of Bromeliaceae, contain several rows of palisade cells which contain nothing but cell sap, and the chlorophyll is confined to the spongy parenchyma in the lower three-fifths of the leaf. The fruit contains only faint traces of starch during early growth and none when it reaches maturity. During the growth of the fruit relatively small amounts of sugars are stored in it, but there is a rapid accumulation of sugars within the short period of normal ripening. The sugars of the fruit are derived from the starch previously stored in the stalk, hence pineapples gathered green do not develop a normal sugar content in subsequent ripening.

The authors found that the pineapple is exceedingly sensitive to adverse physical and chemical conditions in the soil. They suggest that other crops less sensitive to manganese than pineapples be grown on highly manganiferous soils. Thus far the best method of handling pineapples on manganiferous soils consists in applying soluble phosphates and planting old stumps instead of suckers.

The thirty years' record of a grass orchard, C. H. HOOPER (*Jour. Bd. Agr. [London]*, 19 (1912), No. 7, pp. 541-545).—A summarized account extending over 30 years is given of a small orchard, chiefly of cherries, showing actual returns and the method of cultivation adopted during that period.

An experiment in breeding apples, U. P. HEDRICK and R. WELLINGTON (*New York State Sta. Bul.* 550, pp. 141-186, pls. 18).—An experiment in breeding apples along Mendelian lines is here reported. The material for this work was derived from 148 crosses made in 1898 and 1899. The crosses were studied from both grafts and seedlings. Various numbers of the following crosses fruited: Ben Davis×Esopus, Green Newtown, Jonathan, McIntosh, and Mother; Esopus×Ben Davis and Jonathan; McIntosh×Lawyer; and Ralls, Rome, and Sutton×Northern Spy. A tabulated description of the crosses shows the size and shape of tree, yield in 1911, and the size, shape, color, flavor, and season of fruit, together with comparative notes. The transmission of characters among the different crosses is discussed and descriptions are given of a number of promising varieties secured from the crosses and named after counties in the State.

The authors find that these crosses strikingly contradict the idea that seedling apples revert to the wild prototype. The stimulus of hybridity was very marked in the vigor of the crosses under consideration, and the behavior of some of the crosses strongly suggests that apples may be prepotent in one or more of their characters. It is concluded that although the inheritance of skin color, flesh color, size, and shape is more or less hypothetical, acidity is undoubtedly inherited as a Mendelian character.

In regard to color of skin the fruits in which yellow predominates over red seem to be in a heterozygous condition for yellow and red. Fruits in which red predominates are either homozygous or heterozygous, and the pure yellows are homozygous. No conclusive data were secured as to color of flesh, although crosses of Ben Davis and of McIntosh appear to carry yellow and white, the white being recessive.

Establishing laws of inheritance of size and shape in apples promises to be a difficult task, since these characters are subject to so many external conditions. The data at hand, however, indicate that size and shape are inherited

practically as intermediates. The study of the inheritance of sweetness and sourness was based wholly on crosses of subacid varieties. The total progeny indicates strongly that crosses of these subacid varieties break up in the proportion of 3 sour apples to 1 sweet one.

The authors call attention to the following difficulties likely to arise in the application of Mendelian principles in the breeding of apples: The determination of the factors by which the various characters are transmitted; complications arising when a character skips a generation—does not appear in the F<sub>1</sub> generation; it is possible that some characters may be linked together in transmission and that others will repel each other; the bringing together of complementary characters may result in reversions and thus produce unexpected characters; the breeder will not be able to obtain new characters by working with Mendelian characters nor augment those that exist with the possible exception of size and vigor; it will be necessary to work with large numbers of plants—which is difficult with apples; disappointments will often come from the attempt to work with fluctuating variations; and there is likely to be much confusion between "simple Mendelian characters" and "blending characters."

Some new apples from known parents, F. H. HALL (*New York State Sta. Bul. 350, popular ed., pp. 12*).—A popular summary of the above bulletin.

Apples of Missouri, W. W. CHENOWETH (*Ann. Rpt. Missouri Bd. Hort., 5 (1911), pp. 271-336, figs. 40*).—This comprises descriptions of Missouri's most important varieties of apples. The material is compiled principally from The Apples of New York (E. S. R., 17, p. 1157), only such changes having been made as were deemed necessary to adapt the subject matter to Missouri conditions.

Artificial cross-fertilization of the mango, A. J. BROOKS (*West Indian Bul. 12 (1912), No. 4, pp. 567-569*).—A preliminary experiment in the development of improved varieties of mangoes by cross-fertilization is briefly described.

Report of the assistant horticulturist, T. B. McCLELLAND (*Porto Rico Sta. Rpt. 1911, pp. 28-31*).—A brief statement of the station's work with coffee (E. S. R., 25, p. 746), vanilla, rubber (E. S. R., 25, p. 749), and cacao.

In addition to the old plantings of Porto Rican coffee a number of introduced coffees have now come into bearing. The coffee trees in the transplanting experiment begun in August, 1909, show a tendency toward earlier production where the trees were planted when less than a year old, and also where older trees were transplanted with a ball of earth. Storage and germination tests were conducted in 1909 and 1910 to determine whether the viability of coffee seed might be prolonged by excluding the moist air of the Tropics. In all these tests, the seeds which were very severely dried for any considerable length of time had their viability destroyed. A certain amount of moisture, as yet undetermined, appears to be necessary for its prolongation.

Experimental tapping of 8 to 9-year-old Castilla rubber trees gave only a slightly greater yield than that of the year preceding.

Fertilizers for carnations, D. LUMSDEN (*New Hampshire Sta. Bul. 159, pp. 3-14, figs. 4*).—This comprises a study of the relative value of nitrate of soda, muriate of potash, ground bone, a commercial fertilizer, and hen manure as top-dressings for carnation plants grown on raised benches in the greenhouse. Observations are also made relative to the difference in the keeping qualities of flowers raised under the various treatments given. Ground bone was found to give the best all around results, the vigor of the plants and the keeping qualities of the flowers being markedly superior to the plants treated with other manures.

**Spraying calendar for 1912**, R. K. BEATTIE and A. L. MELANDER (*Washington Sta. Popular Bul. 43, folio*).—Concise directions are given for the control of the more important insect pests and diseases of fruits and vegetables, together with instructions for making spray mixtures.

**Rules and regulations for carrying out the Plant Quarantine Act** (*U. S. Dept. Agr., Office Sec. Circ. 41, pp. 12*).—This circular contains the rules and regulations for carrying out the act of August 20, 1912, a summary of which has been previously noted (*E. S. R.*, 27, p. 494).

## FORESTRY.

**The profession of forestry**, H. S. GRAVES (*U. S. Dept. Agr., Forest Serv. Circ. 207, pp. 17*).—In this circular the author briefly reviews the rapid development of forestry in the United States and discusses forestry as a life vocation. Consideration is given to the character of the work involved, the elements necessary for success, the requirements for an adequate training, the present and probable future of recruits for government, state, and private work, teaching and research work, and its possibilities as a means of livelihood.

**Annual report on the progress, literature, and important happenings in the realms of forestry, hunting, and fishing for the year 1911**, H. WEBER (*Allg. Forst u. Jagd. Ztg., 1912, Sup., pp. VIII+186*).—As in previous years (*E. S. R.*, 26, p. 338), this supplement contains abstracts of the more important literature of the various phases of forestry, together with notes on the principal occurrences relating to forestry, hunting, and fishing during 1911. As in the last supplement, the international scope of the literature reviewed has been strengthened.

**Forestry and forest resources in New York**, F. A. GAYLORD (*N. Y. Conserv. Com., Div. Lands and Forests Bul. 1, 1912, pp. 58, pls. 28*).—This is a conservation bulletin, part 1 of which describes actual forest conditions in this country and especially in New York State, and points out the harmful results which have obtained through waste in exploitation and lack of protection. Part 2 discusses the future possibilities of the forests, outlines the principles of practical forestry, shows what forestry has accomplished in many other countries, and what can be accomplished in this country under proper management.

**Communication on the results of the Saxony state forest administration in 1911** (*Tharand. Forstl. Jahrb., 62 (1912), No. 4, pp. 373-377*).—A statistical and financial statement of the work and results of the forest administration in 1911 with comparative data for 1910.

**On the influence of removing forest litter**, SCHWAPPACH (*Ztschr. Forst u. Jagdw., 44 (1912), No. 9, pp. 533-558*).—The author has conducted observations for a great many years relative to the effect of removing forest litter on the growth of trees, as well as on the character of the undergrowth and the surface of the soil. The observations made in stands of pine, spruce, and beech, largely during the past 12 years, are here tabulated and discussed.

Generally speaking, removing the litter and raking the soil every year has been detrimental to wood accretion even on the better classes of soil. The decrease in wood accretion was also noticeable in stands where the litter was removed every 2 and 4 years. When the litter was removed only every 6 years, the loss in wood accretion was not great. Although removing the forest litter every year tends to stimulate natural regeneration, it also favors the growth of moss and other forest weeds. The injury to beech stands by a too frequent removal of litter was quite evident in the smaller growth of the leaves.

The woodsman's handbook, H. S. GRAVES and E. A. ZIEGLER (*U. S. Dept. Agr., Forest Serv. Bul. 36, rev., pp. 208, figs. 16*).—The present edition of this bulletin (*E. S. R.*, 14, p. 576) has been revised and enlarged, taking the place of the proposed second part of the former bulletin and including both parts in one publication. The work as a whole comprises a collection of tables and rules of practical use to lumbermen, foresters, and others interested in the measurement of wood and timber. A summary of growth investigations is also included.

The Bradley bibliography, II.—Dendrology, Part II, A. REHDER (*Cambridge, Mass., 1912, vol. 2, pp. VIII+926*).—The present volume of the Bradley Bibliography (*E. S. R.*, 26, p. 240) aims to contain the titles of all publications relating to families, genera, and species, together with references to descriptions, notes, and illustrations of woody plants contained in articles published in periodicals and serials and in smaller publications or in books dealing with subjects foreign to taxonomy where they are often apt to be overlooked.

Silvical leaflets (*U. S. Dept. Agr., Forest Serv. Silv. Leaflets 45, pp. 6; 51-53, pp. 4 each*).—Four numbers of series of leaflets, each dealing with the range and occurrence, climate, associated species, habit, soil and moisture, tolerance, growth and longevity, susceptibility to injury, reproduction, utilization, and management of one of the following species of trees in the order corresponding to the leaflet numbers above: Western hemlock (*Tsuga heterophylla*), broadleaf maple (*Acer macrophyllum*), Oregon oak (*Quercus garryana*), and red alder (*Alnus oregona*).

Mechanical properties of redwood, A. L. HELM (*U. S. Dept. Agr., Forest Serv. Circ. 193, pp. 32, figs. 8*).—This circular presents the results of one of the series of tests which the Forest Service has been making to determine the mechanical properties of the commercial woods of the United States (*E. S. R.*, 25, p. 342; 26, p. 443). The tests here reported were conducted in cooperation with the universities of California and Washington.

The test material was divided into 2 classes, the first of which included stringers and joists containing defects similar to those present in timber purchased on the market. This material was tested to secure strength values for use in design, to find out whether there were differences in strength values of timber from different localities, and to determine the influence of seasoning and defects on the strength of commercial sized timbers. The second class, made up of small, clear, straight-grained specimens cut from the uninjured portions of the tested stringers and joists, was tested to study the effects on their strength of the rate of growth, of the proportion of summerwood, and of the weight. Four kinds of tests were made to show strength in bending, in compression parallel to grain, in compression perpendicular to grain, and in resistance to shearing. The data secured in each of these tests are tabulated and discussed.

In conclusion the redwood lumber manufacturers' rules for grading are compared with a set of tentative grading rules for structural timbers prepared by the Forest Service.

The absorption of creosote by the cell walls of wood, C. H. TRESDALE (*U. S. Dept. Agr., Forest Serv. Circ. 200, pp. 7, fig. 1*).—Tests recently conducted by the Forest Products Laboratory and here tabulated and discussed show that a decided swelling takes place in wood impregnated with creosote. This swelling is caused by the absorption of the creosote by the cell walls. The average increases in volume resulting from the treatments of yew heartwood, yew sapwood, hemlock heartwood, and hard maple heartwood in percentage of the volumes before treatment were 6.81, 10.7, 7.3, and 8.14, respectively.

Condition of experimental chestnut poles in the Warren-Buffalo and Poughkeepsie-Newton Square lines after five and eight years' service, C. P.

Winstow (*U. S. Dept. Agr., Forest Serv. Circ. 198, pp. 13, figs. 2*).—This circular, which supplements a previous bulletin dealing with the preservative treatment of poles (*E. S. R., 25, p. 344*), gives the results of inspections of 2 experimental lines, 5 and 8 years, respectively, after their establishment.

The poles for the Warren-Buffalo line were cut and peeled during 1902 and 1903 and seasoned in single tiers about 2 ft. above the ground in June and July, 1905. Some were butt-treated with various preservatives by the brush method and others with coal-tar creosote by the open tank method (*E. S. R., 10, p. 243*). Six hundred and thirteen treated poles, together with 551 untreated seasoned and green poles were placed in a line extending through a variety of soil conditions.

At the end of 5 years both the green and seasoned poles butt-treated with coal-tar creosote by the open tank process showed practically no decay at or near the ground line. Poles brush-treated with 2 coats of coal-tar creosote, Avenarius carbolineum, S. P. F. carbolineum, and wood creosote showed but little difference in the extent of decay and ranked next best to the poles treated with coal-tar creosote in the open tank. Poles brush-treated with only 1 coat of preservative showed a much higher percentage of decay than those given 2 coats. With poles brush-treated with only 1 coat of creolin and of coal tar, the loss was nearly as great as with the untreated. The untreated poles were practically all more or less affected with decay at the ground line, the average loss of circumference for those seasoned prior to placement being 1.01 in. and for those placed green 1.15 in. An inspection relative to insect damage to poles in this line was made by the Bureau of Entomology and is discussed in a previous bulletin (*E. S. R., 25, p. 51*).

Only 72 poles were placed in the Poughkeepsie-Newton Square line and records showing the details of their preparation and treatment are not available. As inspected after a lapse of 8 years, however, the untreated poles set in crushed stone showed less decay at the ground line than similar poles set in sand, the average loss of circumference at that point being 1.77 in. and 2.27 in., respectively. The poles with charred butts showed less decay at the ground line than similar uncharred and untreated poles set in either crushed stone or sand, their average loss in circumference at the ground being only 0.71 in.

#### DISEASES OF PLANTS.

Report of the pathologist, G. L. FAWCETT (*Porto Rico Sta. Rpt. 1911, pp. 87-89*).—Spraying experiments with Bordeaux mixture on coffee trees were carried on with particular reference to its adhesiveness when used as a spray. Bordeaux mixture made up with but half the usual amount of water without the addition of any adhesives was found to adhere to the foliage better than Bordeaux mixture made by the usual formula to which adhesives were added.

A bud rot of the coconut has been found sporadically in a number of places but does not appear to be seriously affecting the groves. Bacteria have been isolated from the diseased tissue in every case studied, but no uniformity in the results of the studies has been obtained.

Work in soil biology has consisted largely in an examination of soils for protozoa, and in some of the so-called "sick" soils, where the conditions were the worst, the complete absence of protozoa was noted. Samples of these soils were disinfected with heavy applications of carbon bisulphid, but from the results of the study it appears that any benefit that is derived from the disinfection of the soils can not be attributed to the destruction of protozoa.

Root nodules were found to occur abundantly in the royal palm, and these have been studied with reference to their possible relation to nitrogen assimilation.

Where plants were grown in sterilized soil no fungus was found in conjunction with the nodules, but it was present in most of the other cultures, and except in the youngest nodules there was a rich development of proteids. Notes are also given on the occurrence of "air roots" on the royal and some other palms.

New diseases of cultivated plants, A. PUTTEMANS (*Bul. Soc. Roy. Bot. Belg.*, 48 (1911), No. 4, pp. 235-247, figs. 3).—Three diseases are reported from Brazil as found there, usually on introduced plants, rarely on native species. A spot disease of begonia is claimed to be due to a new fungus here described as *Oidium begoniae*. A cauliflower disease is ascribed to *Alternaria brassicae*. A parasite, found to cause a leaf spot of *Chrysanthemum indicum*, is described as a new species under the name *Cercospora chrysanthemi*.

Plant diseases, 1909-10, A. OSTERWALDER and O. SCHNEIDER-ORELLI (*Landw. Jahrb. Schweiz*, 26 (1912), No. 6, pp. 275-279).—A report is made concerning a large number of diseases due mostly to fungi noted in various localities as affecting fruit trees and fruits, grapes, vegetables, berry crops, and forest trees.

The influence of nutrition and weather upon plant diseases, L. HILTNER (*Jahrb. Deut. Landw. Gesell.*, 27 (1912), No. 1, pp. 156-169, pl. 1).—Details are given of studies on several crops, leading to the conclusion that the known relation between weather and certain plant diseases consists not alone in the influence of weather upon disease-producing agencies directly, but also in its influence upon the plant itself and especially upon its nutrition.

The action of some acid salts upon the development of *Aspergillus niger*, A. KIESEL (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 2, pp. 198-196).—A study was made by the author on the effects of 27 acids and acid salts on *A. niger* ascertaining in case of each the concentrations necessary to arrest, respectively, germination of conidia, development of mycelium, and fructification. The details are given in tabular form.

Contribution to the study of the sooty molds, G. ARNAUD (*Ann. École Nat. Agr. Montpellier, n. ser.*, 12 (1912), No. 1, pp. 23-54, figs. 13).—In extension of previous work (*E. S. R.*, 25, p. 452), the author gives detailed results of his studies, both morphological and physiological, on a number of species of the sooty mold, including the relations of certain of these molds to honeydew.

Studies in Chinese fungi, I. MIYAKE (*Bot. Mag. [Tokyo]*, 26 (1912), No. 303, pp. 51-66, pl. 1; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intl. and Plant Diseases*, 3 (1912), No. 7, p. 1675).—Among the species of fungi discussed are many parasites of economic plants. Of these nine, claimed to be new, are described under the following names and in connection with the following hosts: *Cercospora aleuritiidis*, on leaves of *Aleurites cordata*; *Helminthosporium sapii*, on leaves and leafstalks of *Sapium sebiferum*; *H. sesami*, on leaves of *Sesamum indicum*; *Brachysporium phragmitis*, on leaf nervures of *Phragmites communis*; *Septoria amphigena*, on leaves of *Bupleurum falcatum*; *S. piri*, on leaves of *Pyrus sinensis*; *Nothopatella chinensis*, on branches of *Broussonetia papyrifera*, *Prunus persica*, and *Morus alba*; *Coniothyrium kraunhiae*, on leaves of *Kraunhia pinnatifida*; *Macrophoma sophorae*, on leaves of *Sophora japonica*; *Ustilago penniseti*, on glumes of *Pennisetum compressum*. Some of these are the most very destructive.

Grain diseases, 1911, E. RIEHM (*Centbl. Bakt. [etc.]*, 2, Abt. 2, No. 14-17, pp. 434-472).—This is a comprehensive review of the diseases of grain diseases and pests during 1911, with an extensive bibliography covering the year.

Control of loose smut of barley and wheat, B. SCHANDER (*Kaiser Wilhelm Inst. Landw. Bromberg, Abt. Pflanzenkrankh. Flugbl.* 16, 1912, pp. 4, fig. 1).—This is a brief discussion of apparatus and methods for application of the bot-water.

treatment to seed wheat and barley for protection against loose smut. See also a previous note (E. S. R., 24, p. 346).

**A rust-resistant hybrid wheat, SOHRBAUX** (*Bul. Soc. Nat. Agr. France*, 72 (1912), No. 7, pp. 636-640).—The author gives an account of his attempts to secure by crossing a wheat resistant to the rust which annually attacks the grain in southeast France. He reports that a hybrid of Biète with Japhet responded best to these efforts, producing a wheat having comparatively few beards, exhibiting in fair degree the desirable features of earliness, quality, yield, and resistance to rust, and giving promise of future improvement in these respects.

**Dry spot of oats, H. ZIMMERMANN** (*Mitt. Deut. Landw. Gesell.*, 26 (1911), No. 20, pp. 245, 246; *abs. in Ztschr. Pflanzenkrankh.*, 22 (1912), No. 4, p. 225).—The author sums up the results of observations made on dry spot of oats in the region of Mecklenburg, describing the appearance and progress of plants showing the disease. This is said to be of very variable severity, and to be probably due to excessive or improper liming in case of certain sandy or light soils of that region.

**Studies on canker in clover, L. HILTNER and G. GENTNER** (*Prakt. Bl. Pflanzenerbau u. Schutz, n. ger.*, 10 (1912), No. 8, pp. 90-95).—This author claims that the appearance of clover canker, in most of the cases observed, was due to the use of imported seed and that different varieties of clover were affected in markedly different degrees. A brief discussion of the modifying effect on crop returns of climate and manures is also given.

**The prevalence of disease among varieties of sugar cane, J. B. HARRISON and F. A. STOCKDALE** (*Jour. Bd. Agr. Brit. Guiana*, 5 (1912), No. 4, p. 226).—The susceptibility of several varieties of Bourbon cane in regard to resistance to attacks of rind fungus is discussed.

**Canker or rot of Solanaceæ: Eggplant, peppers, and tomato, P. VOGLINO** (*Italia Agr.*, 49 (1912), No. 3, pp. 56-58, fig. 1; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 1065, 1066).—*Ascochyta hortorum*, found in 1908 to cause a drying up of the leaves and fruits of eggplant, was in 1910 observed in France on stems of that plant. In the same year it was noted on tomato plants in Turin, the cankerous brown spots spreading from stalks and leaves to green or maturing fruits and darkening and rotting the pulp. Spraying with Bordeaux mixture proved an efficient remedy. The author offers the hypothesis that to this fungus also may be attributed the withering of peppers, producing much damage during recent years in Piedmont.

**Celery blights and how to control them, E. M. STREIGHT** (*Veg. Grower*, 2 (1912), No. 3, pp. 4, 16, figs. 7).—An account is given of the appearance, mode of attack, and progress of *Cercospora apii* and *Septoria petroselinii*, said to cause, respectively, early and late blight of celery. Spraying with the usual Bordeaux mixture is claimed to prevent both spread and infection, if used in time.

**Some apple diseases and their treatment, C. BROOKS** (*New Hampshire Sta. Bul.* 157, pp. 32, figs. 30).—This is a revised edition of Bulletin 144 of the station (E. S. R., 22, p. 747), with some additional information relating to the fruit spot of the apple due to *Phoma pomi*, a preliminary account of which has been noted (E. S. R., 27, p. 652).

**[Diseases of peaches in the Caucasus and resistant varieties], A. S. BONDARTSEV** (*Zhur. Bol'ezni Rast.*, 5 (1911), No. 5-6, pp. 134, 135; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, p. 1061).—Among the causes of diseases attacking peaches in the Caucasus region in 1911 are mentioned *Eoascus deformans*, *Cercospora cerasella*, *Puo-*



*cinia pruni-spinosa*, *C. persicae*, *Sphaerotheca pannosa*, and *Monilia fructigena*. Varieties of peaches found resistant are named in connection with each of the first three fungi above listed.

A contribution to the study of olive rot, G. DE MICHELE (Bol. Arbor. Ital., 7 (1911), No. 3-4, pp. 179-192, figs. 7).—This disease is said to affect old olive trees of diminished vitality, or young trees in consequence of injuries of improper culture. These conditions favor the activity of bacteria which produce changes in the living tissue followed by gradual death of the tree, the details of the process not yet being beyond dispute.

Incipient appearances are said to be subdued by setting out cleanly the affected parts and thoroughly disinfecting the wounds. For more advanced stages a similar but more radical treatment is prescribed. Remedial measures looking to the preservation of vigor in the trees are also recommended.

Eruptive disease, or "exanthema," of orange trees in Australia, C. C. BRITTLERANK (Jour. Dept. Agr. Victoria, 10 (1912), No. 7, pp. 401-404, figs. 2).—The author briefly describes this disease, which is claimed to be physiological and to be due primarily to weakened vitality. This weakening is attributed generally to porous, deep, coarse, sandy soil, lacking in organic matter, drying out quickly after rain; to continued drought followed by heavy rain; and to the presence of large amounts of nitrogenous manures.

Remedial measures suggested include the plowing in of green crops previously manured with superphosphates, and avoidance of nitrogenous manures.

Permanganate of potash in viticulture, C. TAUCHOT (Prog. Agr. et Vit. (Ed. l'Est-Centre), 33 (1912), No. 34, pp. 229-231).—The author recommends as a remedy for a gray rot of grapes, ascribed to *Botrytis cinerea*, a mixture of 15 parts of permanganate of potash with 85 parts of sifted lime, applied in powdered form, preferably after rain or a heavy dew. In a second formula, 5 per cent of alum replaces an equal proportion of the permanganate. The action is claimed to be certain.

Grape chlorosis and its treatment with sodium nitrate and iron sulphate, E. CHANCIN (Jour. Agr. Prat., n. ser., 23 (1912), Nos. 22, pp. 683-686; 23, pp. 715, 716).—Chlorosis of grape leaves is here held to be due in general to poor nutrition, most commonly with lime as a primary injurious factor assisted by various secondary conditions.

Experiments were conducted under direction of the author in treating seriously affected vines with solutions of sulphate of iron and nitrate of soda. The iron salt did not give very good results. The treatment with nitrate of soda in most instances showed considerable improvement, and in many cases complete recovery, where the dose amounted to 25 or 30 gm. per stock.

The subsequent influence of fungicides on the vigor and production of grapevines, and their resistance to chlorosis, J. L. VIDAL (Rev. Vit., 37 (1912), No. 965, pp. 813-818, figs. 2; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 8, pp. 1837, 1838).—The experiments reported are said to indicate that mildew exercises a more or less remote influence on grapevines, as shown by the reduction of resistance to chlorosis, weakening of vegetation, and lowering of productivity, these influences being somewhat proportional to the damage inflicted at any given time by the fungus, early invasions usually resulting in greater subsequent damage to the vines.

The author concludes that protection by spraying should extend not only to present crops but to vines with a view to future returns, even light attacks of mildew being carefully guarded against for the sake of greater vigor in the vines.

The conditions for development of grape mildew, L. RAVAZ and G. VERGE (*Les Conditions de Développement du Mildiou de la Vigne*. Montpellier, 1912, pp. 61, figs. 9).—The authors here present in connected form the results of their studies on the conditions controlling the development of grape mildew, most of which have already been previously noted (E. S. R., 27, p. 449).

Third year's experiments in the treatment of grapevine mildew in the Bombay Presidency, W. BURNS and G. B. PATWARDHAN (*Dept. Agr. Bombay Bul.* 51, 1912, pp. 6).—In the third year of experimenting for the control of grape mildew (E. S. R., 27, p. 49) sprayings from 3 to 5 in number were given in 3 districts. The resulting percentages of mildewed grapes ranged from 1.7 to 21, averaging 9.7 per cent, for sprayed vines; and from 42 to 100 per cent, averaging 68.8 per cent, for unsprayed vines. The sprayings recommended employ Bordeaux mixture of full strength about the middle of May, August, and October, and of half strength again about the first of December and January with plenty of soap to make the fungicide stick to the bunches.

The amount of copper left on the grapes was not considered deleterious to users and the stains were found to be easily removable by simply dipping in weak vinegar or soaking in clean water over night.

A new plan of attack on grape mildew, H. FAES (*Bul. Soc. Agr. France*, 1912, May 15, pp. 513-523).—The substance of this article has already been noted (E. S. R., 26, p. 550).

The spread of American gooseberry mildew, S. CASTLE (*Gard. Chron.*, 3. ser., 52 (1912), No. 1338, p. 138).—The author reports that in the neighborhood of Wisbech the American gooseberry mildew is making rapid headway in spite of all efforts looking toward its control.

Two fungus diseases of tulip bulbs, A. A. ELENKIN (*Zhur. Bol'sezni Rast.*, 5 (1911), No. 5-6, pp. 105-124; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 1066, 1067).—Tulip bulbs were attacked by two different fungi, the first being recognized as *Botrytis cinerea*, the second in form and habits somewhat resembling *Sclerotium tuliparum*, and possibly being identical therewith. The two are usually found on the same bulb, rarely attacking separate plants. Methods of control recommended are uprooting and burning of affected bulbs, and disinfection of the soil with carbolineum.

A new bacterium causing a disease of *Matthiola annua*, G. BRIOSI and L. PAVARINO (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5. ser., 21 (1912), II, No. 3, pp. 216-220).—A disease of *M. annua* is described which, it is said, may extend to any part of the plant. A bacterium was isolated and cultivated to which the disease is ascribed. The organism is claimed to be new and has received the name *Bacterium matthiolae*.

Observations on *Asarum europæum* and its mycorrhiza, E. J. SCHWARTZ (*Ann. Bot. [London]*, 26 (1912), No. 103, pp. 769-776, pls. 2).—As a result of the author's investigations, it is stated that *A. europæum* harbors in its roots a fungus very similar to those of *Thismia aseroë* and *Neottia nidus-avis*, and limited to the cortical region abutting on the steles of the young roots. Thick-walled swellings found on some hyphae are said to represent a resting stage of the fungus. A bibliography is appended.

Knobs and exostoses on trees, E. LEMÉE (*Rev. Hort. [Paris]*, 84 (1912), No. 14, pp. 336-338, figs. 16).—Attention is called to various kinds of swellings and excrescences on roots, trunks, limbs, and twigs of certain trees, known or suspected to be due to the activity of fungi or other parasites.

Studies on gum flow and frost injuries of various trees, II, P. SOBAUER (*Landw. Jahrb.*, 41 (1911), No. 1, pp. 131-162, pls. 2; abs. in *Bot. Gaz.*, 54 (1912), No. 2, pp. 173, 174).—In continuation of previous work on the factors

operative in gummosis (E. S. R., 23, p. 353; 24, p. 554), the author holds that stimuli, such as frosts and wounds, only accentuate a natural tendency latent in cherry and other trees to gummy degeneration and related phenomena due to variations in growth and nutrition which may be regarded as not abnormal. These may result in cell immaturity, unbalanced tensions, excess of enzymes, and degeneration processes extending from cell to cell. Such groups of degenerated cells are usually more abundant in the late fall growth. Looseness of structure appeared to be closely related with susceptibility to frost influence and formation of gum.

Detailed studies were made of numerous widely separated genera of trees.

**The Pennsylvania Chestnut Blight Conference** (*Harrisburg: State, 1912, pp. 253, pls. 43*).—This is a report of the proceedings of a conference, called by the Governor of Pennsylvania to meet at Harrisburg, Pa., February 20 to 21, 1912, to consider ways and means of preventing the spread of the chestnut tree bark disease. An address by the governor, and numerous papers, reports and discussions by scientists, foresters, manufacturers, and others, bring out what was known at that date and what it was considered should be known concerning this disease.

**Notes on the chestnut bark disease, H. R. FULTON** (*In Pennsylvania Chestnut Blight Conference. Harrisburg: State, 1912, pp. 48-56*).—The author reports on a study of the means, methods, and conditions of transmission of this disease, in substance briefly as follows:

The infective material in case of *Diaporthe parasitica* consists in its conidia and its ascospores. Tests made with air currents as carriers of conidia, dry, damp, and under strong spraying to simulate storm conditions, showed that conidia can be detached by strong air blasts and carried short distances. Conidia in a dry room at ordinary temperature, retained their germinability for four months, but not for five, while material exposed out of doors and that kept moist at about 75° F. in a greenhouse did not germinate after four months. Both kinds of spores germinated in a decoction of chestnut bark, in rice broth, etc. Ascospores germinated in spring water, while conidia did not. Germinability of conidia is most favored at 60°, decreasing considerably at 10° above or below that point. Ascospores germinated best at 70°, but also fairly well at 45° or 85°, and they still germinated readily after at least moderate freezing. The effect of extreme temperatures was not investigated. In general, the most rapid early growth is at the optimum temperature for germination.

In the laboratory the fungus grows well on a variety of artificial media, particularly on a slightly acid potato agar. Some evidence seems to point to the possibility of its living on at least dead parts of trees other than chestnut, as oaks, etc., though such have not been shown to be diseased by the fungus. Infections were found where injuries to chestnuts had been inflicted by lightning, etc., both sapwood and heartwood becoming infected by spreading of the fungus if the cut surface was kept moist. Insect injuries also appeared to be favorable points for development of infection from spores. Field studies at Orbisonia, Pa., seem to indicate that there had been a very rapid spread of the disease recently; that insects may carry infection up the branches and into the cracks and holes; that moisture favored infection in certain cases; that younger trees were more susceptible than older ones; and that birds were not notably, if at all, connected with the carrying of spores.

**Longevity of mycelium and spores of *Diaporthe parasitica***, CAROLINE BURNARD (*In Pennsylvania Chestnut Blight Conference. Harrisburg: State, 1912, pp. 241, 242*).—An attempt was made to germinate spores from an infected chestnut collected in July, 1908, and kept continuously in a moist place until April, 1912. The fungus made a small growth, but after start-

ing to produce a small number of pycnidia it ceased to grow. Spores also germinated, but these too made only a small growth, producing no pycnidia. The apparent loss of vitality, it is suggested, might have been due to *Penicillium*, a growth of which covered the surface of the specimen.

The possibility of a medicinal remedy for chestnut blight, CAROLINE RUMBOLD. (In *Pennsylvania Chestnut Blight Conference, Harrisburg: State, 1912*, pp. 57, 58).—The author reports in regard to medicinal treatment of chestnut blight that experiments are under way, but are as yet incomplete, considering the influences of soil and atmospheric moisture, of fertilizers, of healthful or unhealthful surroundings and conditions of the tree, of wounds, etc., on the susceptibility of the tree to disease, and on its reaction to treatment. She states also that experiments to test the relative vitality of the mycelium and of the two kinds of spores and others with chemicals toxic to the fungus are in progress, as well as studies on the question of immunity of different kinds of trees.

The biological relations of *Rhytisma acerinum* to various maples, K. MÜLLER (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 7, pp. 385-391).—The author investigated *R. acerinum* for the purpose of determining whether or not this fungus is to be classed as a single species. Inoculation experiments were carried on with several species of maple in the open air during 1908-1911 with the following results:

Spores from *Acer platanoides*, which is widely distributed, easily infected this maple and *A. campestre*, but, in general, only partially and weakly *A. pseudoplatanus* and *A. dasycarpum*.

Morphologically similar fungi from *A. pseudoplatanus* from several localities severely infected the same maple in the locality of the experiment, while the other species of maple were not attacked at all. This biologically distinct species of fungus was named *R. pseudoplatani*. *R. punctatum*, which is claimed to be limited to *A. pseudoplatanus*, is morphologically distinguished from *R. pseudoplatani* by its larger sclerotia and spores.

Spores from the fungus on *A. campestre* attacked this maple severely, less so *A. platanoides*, and not at all *A. pseudoplatanus*. The fungus is considered to be a specialized form of *R. acerinum*, less distinct than is *R. pseudoplatani*, and to it the name *R. acerinum campestre* is given. Further reports are promised on the morphological relations of *R. acerinum*.

Oak disease in 1909 and 1910, É. PAQUE (*Bul. Soc. Roy. Bot. Belg.*, 48 (1911), No. 1, pp. 22-26).—A brief account is given of the oak disease due to *Oidium* in France. During 1909 and 1910 its intensity is said to have diminished somewhat in that section. Lists are given of the species of trees attacked and those exempt. Attention is drawn to the fact that, while almost every native oak was attacked, nearly all foreign species in the same forests appeared resistant to this fungus.

The oak *Oidium* in France, G. TRINCHIERI and L. MANGIN (*Jour. Agr. Prat.*, n. ser., 23 (1912), Nos. 16, pp. 496, 497; 23, pp. 719-721).—This is a continuation of contributions made by these authors and by G. Arnaud and E. Foëx on oak *Oidium* (*E. S. R.*, 20, p. 757; 23, p. 354; 25, p. 248; 27, p. 753), the later discussions being somewhat controversial.

Oak *Oidium* in Sologne, E. NOFFRAY (*Bul. Soc. Nat. Agr. France*, 72 (1912), No. 7, pp. 575-584).—An account is given of the appearance of oak *Oidium* in Sologne in 1907 and of its progress, habits, and damage in that district.

It is stated that but slight infection by this fungus is noted in growths of 4 years and over, but that it severely attacks the younger trees and branches. From this fact it is concluded that this fungus may be checked, possibly exterminated, in a few years by sacrificing these younger growths for a while, if

necessary, and by early and free use of such fungicides as sulphur, polysulphide, and permanganate of potash with a view to prevention rather than cure.

A root disease of the Para rubber tree (*Ficus semitostus*), K. BANTAM (Dept. Agr. Fed. Malay States Bul. 13, 1912, pp. 30, pls. 79).—This is a brief discussion of the history, distribution, spread, symptoms, and treatment of the root disease of *Hevea brasiliensis* and of its relation to other hosts and to attacks by insects.

The disease attacks the roots, cutting off the water supply, yellowing and wilting the leaves, and killing the trees in from 4 months to 2 years according to age. The fungus seems to propagate itself mainly by means of mycelium which spreads in the roots, living or dead; also to some extent in the soil, attacking live roots of young or old trees, but soon disappearing if left without its customary substratum.

Moisture, abundance of vegetable matter, acidity of soil, and darkness favor mycelial growth. Experiments with artificial infections by means of mycelium were successful in 10 out of 14 plants tried. Infection of living plants from dead roots is thought to be the usual mode of transmission. Spores arise from two forms of fructification, but are not known to carry the disease. Several other hosts are known, all being woody plants.

Methods of treatment include isolation by means of trenches; sanitation by removal or burning in place of all infected or suspected trees or parts; application of lime to neutralize acidity, and possibly as a fungicide; drainage; and utilization of the space with immune trees, while the infected roots of the removed trees are disappearing from the soil.

A brief bibliography is appended.

Two new diseases of *Sophora japonica*, M. TURCONI and L. MAFFEI (Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 21 (1912), II, No. 4, pp. 246-249).—This is a preliminary note descriptive of two new fungi, which have received the names *Macrosporium sophorae* and *Gibberella briosiana*, attacking, respectively, leaves and branches of the pagoda tree of China and Japan.

A case of gummosis in teak, J. A. HONING (Meded. Delt-Proefstat. Meden, 7 (1912), No. 1, pp. 12-15, 59).—An account is given of the evident infection of teak nursery stock with *Bacillus solanacearum*, causing gummosis, this being claimed to be the first instance in which this plant has been attacked by this disease.

*Macrophoma excelsa infestans* parasitic on *Abies concolor* in Russia, I. A. OHL (Zhur. Bolitzni Rast., 5 (1911), No. 5-6, pp. 127-134, pl. 1, figs. 2; Bot. Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 4, pp. 1067, 1068).—In Poltava A. *concolor* showed disease due to a parasite identified as a *Macrophoma*, for which the author suggests the name *M. excelsa infestans*. The use of fungicides in spring, and burning and removal in autumn, are remedial measures recommended.

*Lophodermium nervisequum* parasitic on fir needles, E. MEN (Bul. Soc. Nat. Agr. France, 72 (1912), No. 7, pp. 615-625; Rev. Eaux et Forêts, 51 (1912), No. 16, pp. 481-493, pl. 1).—Pursuant to studies previously noted (E. S. R., p. 47; 23, p. 451) with *L. macrosporum* on spruce, the author reports his investigations with *L. nervisequum*, parasitic on fir, which it is said to attack when meeting it in a state of deficient nutrition, and causing, as does *L. macrosporum*, considerable loss in France. Experiments seem to show the protective value of keeping trees well nourished and vigorous.

Root disease of pine, M. MANGIN (Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 23, pp. 1526-1528).—The author made a study of this disease, the fungus (*Rhizina inflata*) said to cause it, and of the effects of forest fires.

are claimed to favor its attacks. As a result of these investigations, conclusions are reached that *R. inflata* is common even on sound trees in the glaciers of Fontainebleau; that the development of the fruiting bodies is favored by the fertilizing constituents of ashes left by forest fires and by the fires; and that it is at present doubtful whether the disease is caused by invasion of the pine roots by the mycelium of *R. inflata* which, according to the author, occurs rather after the weakening of the tree by the disease, the reason of which he claims to be at present unknown.

Experiments in spraying with polysulphids and other fungicides in 1911, R. FANTAUZZI (*Staz. Sper. Agr. Ital.*, 45 (1912), No. 3, pp. 161-190).—The author's experiments resulted in the following conclusions:

The polysulphids of calcium, barium, and zinc with sodium have shown an efficacy equal or superior to that of Bordeaux mixture in controlling *Erysiois deformans* and other fungus diseases of peach and apple. They have also been used with success against *Oidium* of rose, oak, and euonymus, against *Eocharidium violaceum*, etc. These polysulphids and combinations thereof with Bordeaux mixture, acetate of copper, and nitrate of silver are recommended as efficacious also against *Peronospora* and *Oidium* of the grape. The polysulphids of barium and zinc with sodium are said to show a stimulating action on vegetation, especially that of peaches, and to be harmless to both leaves and flowers, whereas those of calcium are fatal to the foliage of the peach. The question of relative cost is also discussed.

[The mechanical reduction of spray particles], P. LARUE (*Rev. Vit.*, 57 (1912), No. 967, pp. 879-881, figs. 5).—This is a report on experiments made with nozzles of various forms, but having orifices mainly cylindrical with a conical flare.

It is stated that no conclusions have been drawn as to the best form, but that a suitable smallness of droplets could not be attained at a shorter distance than 50 cm. from the nozzle. This fact is said to be an obstacle to the employment of devices for spraying stems, branches, and lower leaf surfaces with the minimum of economy as regards liquid and labor.

## ECONOMIC ZOOLOGY—ENTOMOLOGY.

Distribution and origin of life in America, R. F. SCHARFF (*London*, 1911, p. XVI+497, pls. 21).—The chapters of this work are devoted to the fauna of Greenland, the fauna of northeastern North America, the animals of the Canadian Northwest, the fauna of Alaska, the Rocky Mountains and their inhabitants, the animals of the Eastern States, the fauna of the Continental East, the Southeastern States and Bermuda, southwestern North America and its fauna, the fauna of Central America, the West Indian Islands and their inhabitants, the fauna and flora of the Galapagos Islands, the animals of the northwestern States of South America, the fauna of eastern South America, and Argentina and Chile.

A bibliography of the principal works consulted in its preparation, consisting of 32 pages, and a general index are included.

Food of some well-known birds of the forest, farm, and garden, F. E. L. MOTT and W. L. MCATEE (*U. S. Dept. Agr., Farmers' Bul.* 506, pp. 35, figs. 16).—This bulletin deals with 20 birds selected because of their economic importance to farmers and fruit growers of the respective regions they inhabit. With the exception of 3 species of sap-suckers, all the birds treated are beneficial and should be recognized and protected. The species considered are, the three-toed woodpeckers (*Picoides arcticus* and *P. americanus*); California woodpecker (*Melanerpes formicivorus*, Baird); Lewis' woodpecker (*Asyndesmus*

lewisii); red-bellied woodpecker (*Centurus carolinus*); sapsuckers (*Sphyrapicus varius*, *S. ruber*, and *S. thyroideus*); hummingbirds (*Archilochus colubris* and *Calypte anna*); Arkansas kingbird (*Tyrannus verticalis*); ash-throated flycatcher (*Myiarchus cinerascens*); western yellow-bellied flycatcher (*Empidonax difficilis*); horned lark (*Otocoris alpestris*); chipping sparrow (*Spizella passerina*); junco or snowbird (*Junco hyemalis*); white-crowned sparrow (*Zonotrichia leucophrys*); southern butcher bird (*Lanius ludovicianus*); Audubon warbler (*Dendroica auduboni*); and ruby-crowned kinglet (*Regulus calendula*).

Fish and game laws of New Jersey (Trenton, N. J., 1912, pp. 232, pl. 1).—This is a compendium of the New Jersey laws.

Capture of Raleigh by the wharf rat, C. S. BRIMLEY (*Jour. Elisha Mitchell Sci. Soc.*, 28 (1912), No. 2, pp. 92-94).—The author reports that while known to have been at Beaufort in 1870, the wharf rat was not observed in Raleigh until 1909. Two years later it appeared in great abundance and slaughtered large numbers of young chickens. The wharf rat is strongly inclined to burrow, while the black and brown rats are climbers.

Life histories of Indian insects, II, D. NOWROJEE (*Mem. Dept. Agr. India, Ent. Ser.*, 2 (1912), No. 9, pp. 165-191, pls. 7, figs. 2).—A number of aquatic Hemiptera and Coleoptera are taken up in this second paper (E. S. R., 24, p. 788).

Recent investigations in insect parasitism, O. H. SWEEZY (*Hawaii. Forester and Agr.*, 9 (1912), Nos. 3, pp. 83-87; 4, pp. 130-135).—A review of recent work.

The effect of heat on certain insect enemies of plants, J. CHAINE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 26, pp. 1833-1836).—High temperatures during the latter part of June and early July, 1911, when the thermometer reached 37° C. (98.6° F.) in the shade, together with a prolonged drought, resulted in the destruction of larvæ and chrysalids of the cochylis moth to such an extent that in certain regions the second generation was nearly completely annihilated. The cecidomyid *Nonarthropalpus buxi*, which develops in boxwood leaves, is said to have been similarly destroyed.

Report of the entomologist, W. V. TOWSE (*Porto Rico Sta. Rpt.* 1911, pp. 32-36).—The work of the year consisted largely of the study of the white grub on cane and an ant which infests coffee and practically all its shade trees. A mosquito survey of San Juan was commenced.

In a study of the flora of practically all districts of the island, undertaken since the bee work previously noted (E. S. R., 26, p. 62), a great number of shade trees used in coffee plantations have been found to produce nectar. In the lowlands guamá (*Inga laurina*), which is by far the best honey plant on the island, is used almost entirely, while in the interior the guava is the principal shade tree in coffee plantations. It is said to be not uncommon for a good strong hive of bees to gather from 5 to 11 lbs. a day from the guamá, which blossoms from 2 to 5 times a year, the bloom lasting from 10 to 15 days. The honey produced is very light in color, resembling the clover honey of the North and running about 12 lbs. to the gallon.

In order to determine the annual production of honey by a good colony, 2 colonies were placed on a pair of scales and their weights taken morning and evening. "The readings showed at what seasons the bees were most active; also what flowers produced the greatest quantity of honey. During a period of 9 months from one of the colonies there were extracted 470 lbs. of honey, while the other produced 337 lbs. The only period when both colonies were not gathering was during September, and during this month the small colony gathered sufficient honey so that it did not have to use any of its surplus. Beginning the latter part of February and through March, April, and May, the bees worked on the general bloom, and it was not uncommon for them to gather

from 1 to 2 lbs. of honey per day." During July and August one of the hives gathered 208 lbs. of honey.

While the native mangoes, with one exception, are comparatively free from insect infestation some of the imported varieties appear to be seriously attacked by the fruit fly (*Anastrepha acidusa*). This fly is very partial to the Cambodiana, practically ruining this variety, it being almost impossible to find a ripe mango that does not contain from 2 to 5 maggots. Upon completing their development the maggots pass into the ground to a depth of 1 to 1½ in. where they pupate in about 24 hours, the pupal period lasting from 13 to 18 days.

A small white scale, which occurs in India, was found on the trunks and large branches of the mango but does not seem to spread rapidly in Porto Rico. At Mayagüez this scale has been found parasitized by the common black fungus, occurring on the white scale of the orange, and a brown fungus which is found on the purple scale in the mountains. Thrips are said to be plentiful on some varieties of mangoes, especially those infested by the fruit fly.

Reports of entomological department, A. E. STENE ET AL. (*Ann. Rpt. Bd. Agr. R. I., Ent. Dept., 26 (1910), pp. 40+11+30, pls. 7, figs. 21*).—The several parts of this report deal with nursery inspection, insect notes, report of a plary inspection, the gipsy and brown-tail moth situation, the elm-beetle and San José scale work, bee keeping in Rhode Island, and how to keep bees.

Combating scale and other insects, L. TRABUT (*La Défense contre les Cochenilles et autres Insectes Fideles. Algiers: Gouv. Gén. Algérie, 1910, pp. 151, pls. 4, figs. 127*).—Noted from another source (*E. S. R., 27, p. 357*).

Insect pests, J. H. FABRE (*Les Ravageurs; Récits sur les Insectes Nuisibles à l'Agriculture. Paris, [1912], pp. 282, pls. 16*).—This is a small popular work.

Sugar cane insects in Trinidad, F. W. URICH (*West Indian Bul., 12 (1912), No. 3, pp. 338-391*).—The principal cane pests and their status in Trinidad are briefly noted.

The enemies of the olive, P. PAPAGEORGIOU (*Ann. Gembloux, 22 (1912), No. 9, pp. 521-531*).—The author here gives a brief account of the olive scolytid (*Phloeotribus oleæ*), olive fly (*Dacus oleæ*), olive scale (*Lecanium oleæ*), and sooty mold (*Fumago oleæ*), and means of combating them.

Insects attacking the prune in the Pacific Northwest, A. B. CORDLEY (*Better Fruit, 7 (1912), No. 2, pp. 9-13, figs. 6*).—This is a brief popular account of the more important insect enemies of the prune, including the western peach and prune borer (*Sanninoidea opalescens*), San José scale, prune twig miner (*Anarsia lineatella*), bud-moth, shot-hole borer (*Xyleborus dispar*), cicadas, the branch and twig borer (*Polycaon confertus*), and tent caterpillars (*Malacosoma* spp.).

Natural enemies of the banana occurring in Queensland, H. TAYON (*Queensland Agr. Jour., 23 (1912), No. 5, pp. 360-363*).—The insect pests here mentioned are the fruit fly *Dacus (Tephritis) tryoni* and a leaf-eating weevil (*Oxytorhynchus* sp.).

Insect pests of cacao, P. L. GUPPY (*West Indian Bul., 12 (1912), No. 3, pp. 316-320*).—In addition to a somewhat detailed account of the cacao beetle (*Bletrastoma depressum*) and cacao thrips (*Heliothrips rubroclavatus*), the author presents a preliminary list of 30 insects affecting the cacao tree, arranged more or less in the order of their importance.

Coconut pests, O. W. BARRETT and D. B. MACKIE (*Philippine Agr. Rev. [English Ed.], 5 (1912), No. 5, pp. 254-261, pls. 5*).—This is a brief account of the enemies of the coconut, including insects, diseases, mammals, birds, and crustacea.

It is said that of 75 or more recorded insect pests of coconut there are only 5 or 6 species that are actually injuring the crop to any great extent and of these



only 2 are of prime importance in the Philippines. "Throughout the Philippine Archipelago, and in fact in all southern Asia and the Malaysian regions, the ung, or rhinoceros beetle (*Oryctes rhinoceros*) causes a tremendous amount of damage. . . . The red weevil (*Rhynchophorus ferrugineus*) is the second most destructive insect attacking coconuts in the Philippines."

The enemies and diseases of the coffee tree in East Africa, H. MURRAY (Pflanzer, 8 (1912), Beiheft 2, pp. V+87, pls. 14).—The first part of this paper (pp. 1-74) is devoted to a discussion of the various animal enemies of the coffee tree, of which the insects make up the greater part.

Forest entomology in the United States, K. ESCHERICH (Naturw. Ztschr. Forst u. Landw., 10 (1912), No. 9, pp. 433-446, figs. 4).—This is a review of the work carried on by the forest insect division of the Bureau of Entomology of this Department, and includes a list of the more important writings on the subject by A. D. Hopkins.

Tetriginæ (Acridinæ) in the Agricultural Research Institute, Pusa, Bihar, with descriptions of new species, J. L. HANCOCK (Mem. Dept. Agr. India, Ent. Ser., 4 (1912), No. 2, pp. 131-160).—Some 24 species are described as new in this paper.

A new pest to maize, C. FRENCH, Jr. (Jour. Dept. Agr. Victoria, 10 (1912), No. 7, pp. 450, 451, figs. 2).—The harlequin fruit bug (*Dindymus versicolor*) is reported to have been the source of injury to corn at Omeo, Gippsland. The injury is caused by sucking the juice from the kernels at the end of the cob.

A note on acid-fast bacilli in head lice (*Pediculus capitis*), G. W. MCCOY and M. T. CLEGG (Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27 (1912), No. 36, pp. 1464, 1465).—In recent work in connection with the study of the possibility of the transmission of leprosy by animal parasites, the authors have found a large number of acid-fast bacilli in smears made from 2 lice (*P. capitis*) taken from an advanced case of nodular leprosy. In morphology, grouping, and tinctorial characteristics, the organisms found in these insects were indistinguishable from the leprosy bacillus.

Leafhoppers affecting cereals, grasses, and forage crops, H. OSBORN (U. S. Dept. Agr., Bur. Ent. Bul. 108, pp. 123, pls. 4, figs. 29).—This bulletin is based upon investigations made in the field, on farms and ranges, under natural conditions in various parts of the United States, and deals particularly with those species affecting the cultivated crops.

On grasses and grains the attack is more commonly noticed in the form of wilted or discolored blotches on the leaves or stems. The author believes that the condition known as "silver top," a whitening of the entire upper part of stem and head, is at times, in blue grass particularly, caused by leafhopper attack. The puncturing of the tissue and pumping of the plant juices result in more or less loss and drain on the plant, the importance of the attack depending upon the abundance of the insects. "All of the crops belonging to the grass family and most of those in general cultivation belonging to the legumes are infested by one or another, often by many, species of the leafhoppers. The abundance and corresponding injury vary greatly with these crops for different parts of the country and under different cultural conditions, as also with different seasons. . . . For the wheat, oats, rye, and barley crops the most important species are, in the North and Northwest, *Cicadula 6-notata* and *Athyana exilis*, and in the South *A. exilis* and *Draculacephala reticulata*. For the grass crop, including timothy, brome grass, and blue grass, the most important species are *Deltocephalus inimicus*, *D. affinis*, *D. configuratus*, *Draculacephala molitor*, and *Phlepsius irritatus*. For clover, alsike, alfalfa, soy beans, and leguminous crops the most important are *Agallia sanguinolenta* and *Empoasca nalk*. The

that in many parts of the country their injury is negligible for such crops as wheat, oats, rye, etc., is due to the rotation or alternation of crops in such places as to make their rapid increase impossible."

Other species considered in addition to the above mentioned are *Draculopoda neoboreocensis*, *Dicrocephala coccinea*, bog leafhopper (*Helochara communis*), *Gysaea octolineata*, *G. bimaculata*, *Tettigonia bifida*, *Hecalus lineatus*, shovel-nosed leafhopper (*Dorycephalus platyrhynchus*), *Parabolorchus crivellii*, sharp-nosed leafhopper (*Platymetopius acutus*), yellow-faced leafhopper (*Platymetopius frontalis*), *P. cinereus*, *Dellocephalus sonorus*, *D. fuscicarpus*, Say's leafhopper (*D. sayi*), *Athysanus curtisii*, *A. bicolor*, *A. obtusus*, and geminate leafhopper (*Thamnotettia geminatus*).

Remedial measures are discussed under the headings of cultural methods, mowing, burning, capturing in hopperdozers or tar pans, and spraying, all of which must be adapted for the seasons or conditions of the crop.

What are we going to do about the frog hopper? J. J. A. CARLEE (*Proc. Agr. Soc. Trinidad and Tobago*, 12 (1912), No. 8, pp. 265-272).—A discussion of the present status of the frog hopper situation in Trinidad.

The spring grain-aphis or "green bug," F. M. WEBSTER and W. J. PHILLIPS (*U. S. Dept. Agr., Bur. Ent. Bul.* 110, pp. 153, pls. 9, figs. 53).—This is a complete report of investigations commenced in the spring of 1907 and continued without interruption up to and including 1911. Preliminary reports upon the work have been previously noted (*E. S. R.*, 19, pp. 53, 452).

The authors first consider the occurrence of the pest in the Old and New World. In the United States outbreaks occurred in 1890, 1901, 1903, and 1907. Then follow accounts of its food plants, character of attack, viviparous and oviparous development, influence of winds and of temperature on diffusion, its embryology, natural enemies, and remedial and preventive measures.

Field spraying experiments indicate spraying to be an impractical measure, even when small areas are involved. Burning or plowing are thought to be more effective. Lime and sulphur dusted on the plants in badly infested areas gave practically no benefits. It is recommended, especially for the South, that all volunteer growth of whatever nature be completely killed out in the fields before seeding the following crop, and it is thought that if this be done such ravages as have occurred in the past can not be repeated.

Investigations seem to indicate that no noticeable good resulted from the introduction of the parasite *Aphidius testaceipes*. "When one stops to consider the numerous and varied hosts of *A. testaceipes*, its manner of hibernation, its wide distribution, and the higher temperature required for its development over and above that needed by its host; also the fact that it may readily be transported along with its host as adults, or within the body of the latter, one can readily see the futility of attempting materially to increase its numbers or efficiency by artificial introduction into grain fields."

Aphidids of southern California, VIII, E. O. ESSIG (*Pomona Col. Jour. Ent.*, 4 (1912), No. 2, pp. 698-745, figs. 17).—This continuation of the author's studies (*E. S. R.*, 23, p. 149) includes descriptions of several new genera and species.

Woolly aphis, or American blight (*Schizoneura lanigera*), W. W. FROG-GATT (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 6, pp. 520-523).—This is a summarized account.

A contribution to the knowledge of the Phylloxerinae, B. GRASSI ET AL. (*Contributo alla Conoscenza delle Fillosserine ed in Particolare della Fillossera della Vite*, Rome, 1912, pp. X+456+LXXV, pls. 20, figs. 31).—The first part of this work (pp. 3-96) deals with studies of phylloxera other than that

of the vine; the second part (pp. 87-417) with studies of the grapevine phylloxera (*Phylloxera vastatrix*) with observations comparing it with other species. A bibliography of 13 pages follows.

A second paper, by Anna Fod (pp. I-LXXXV), is devoted to the biology of the grapevine phylloxera.

**Natural control of white flies in Florida.** A. W. MORRILL and E. A. BARK (U. S. Dept. Agr., Bur. Ent. Bul. 102, pp. 78, pls. 9, fig. 1).—This is a detailed report of investigations commenced in 1906 and extending over a period of 4 years. The subject is taken up under the headings of parasitic and predatory enemies of white flies; snails that feed on sooty mold; climatic conditions; unexplained mortality; dropping from leaves; mortality due to overcrowding; effect of curling and dropping of leaves from drought; bacterial diseases; and fungus diseases.

"No true parasites of these species of white flies are known to exist in this country and their numerous native predatory enemies are usually of no material assistance in their control. Two factors of natural control, overcrowding and unexplained mortality, have heretofore not been recognized or have been confused with the results of attempts at artificial control or with the effects of fungus diseases. The 2 factors named are in effect a reaction from excessive infestation. Bacterial diseases of the white flies are at present unknown but it is not improbable that they are the leading cause of mortality so far unexplained. . . .

"Aside from unexplained mortality, fungus diseases are the most important agents of natural control. The brown fungus (*Ægerita webberi*) and the red Aschersonia (*Aschersonia alcyrodis*) are, in the order named, the most effective parasites of the citrus white fly. The yellow Aschersonia (*A. flavo-citrina*) is the most effective parasite of the cloudy-winged white fly. The cinnamon fungus (*Verticillium heterocladium*) and the Sporotrichum fungus (*Sporotrichum* sp.) are of comparatively little importance. The red-headed scale fungus (*Sphaerostilbe coccophila*) is rarely parasitic upon white flies, while the white fringe fungus (*Microcera* sp.) is with little doubt normally saprophytic. The fungus parasites thrive only under suitable weather conditions during a period of about 3 months each year, generally speaking the summer months in the case of the 2 Aschersonias and the fall months in the case of the brown fungus. Their efficacy in destroying white flies under natural conditions is dependent upon the abundance of the insects; a period of excessive abundance always precedes effective temporary control. . . . Under natural conditions, without artificial assistance in spreading, the fungi have ordinarily, in favored localities, controlled the white fly to the extent of about one-third of a complete remedy through a series of years. . . .

"The authors conclude that there are at present no elements of natural control herein dealt with which can be relied upon to give satisfactory results. Under present conditions it is unquestionably more profitable to depend upon artificial remedies."

**White fly parasites and their attempted introduction into Florida.** R. S. WOOLUM (*Fla. Grower*, 6 (1912), Nos. 9, p. 3; 10, p. 3).—An address on the attempted introduction of insect enemies of the white fly from India, a brief account of which by L. O. Howard has been previously noted (*E. S. R.*, 25, p. 661).

**Some scale insects of Mississippi, with notes on certain species from Texas.** G. W. HERRICK (*Mississippi Sta. Tech. Bul.* 2, pp. 3-78, Nov. 96).—This bulletin discusses the collection and preservation of scale insects, the literature, and the technique to be made use of in preparing them for study, and gives a list of 40 species known to occur in Mississippi, 6 additional from Texas, and 1 from

Louisiana. Technical descriptions and illustrations are presented of 35 of the species.

Mites associated with the oyster-shell scale (*Lepidosaphes ulmi*), H. E. EYING and R. L. WEBSTER (*Psyche*, 19 (1912), No. 4, pp. 121-134, fig. 1).—Observations made in Iowa in 1911 showed a great variation in the condition of the oyster-shell scale at different places in the State. In some of the infested orchards near Ames, as low as 3.7 per cent of the scales contained sound eggs in the spring of 1911, the remainder being either empty or galled by mites. Samples of scale collected in an orchard at Northwood, near the Minnesota line, showed that from 23 to 82.4 per cent contained sound eggs. *Hemisarcoptes malus* is said to be the most important enemy of this scale.

Of a total of 9 species of mites found in connection with the oyster-shell scale 6 were either parasitic or predaceous. These 6 species, notes on which are here presented, are *H. malus*, *Tydeus coccotholus*, *Bdella cardinalis*, *Cyta brevipalpa*, *Anytus agilis*, and *Eupalus* sp.

Studies of intracellular symbiosis, P. BUCHNER (*Arch. Protistenk.*, 26 (1912), No. 1, pp. 116, pl. 12, figs. 29).—This first paper deals with the intracellular symbiosis of Hemiptera.

Eri silk, H. MAXWELL-LEFROY and C. C. GHOSH (*Mem. Dept. Agr. India, Ent. Ser.*, 4 (1912), No. 1, pp. 130, pls. 9, figs. 13).—This paper discusses rearing, diseases, influence of climate, treatment of cocoons, the castor plant, and the eri silk industry in India generally and in Assam.

*Orgyia leucostigma*: A factor in the causation of *Ophthalmia nodosa*, G. W. BEATTY (*Med. Rec. [N. Y.]*, 82 (1912), No. 8, p. 342, fig. 1).—The author reports cases in which the introduction of hairs from the caterpillars of the white-marked tussock moth produced a nodular condition of the conjunctive.

The nun moth problem in Saxony, C. F. C. BEESON (*Quart. Jour. Forestry*, 5 (1912), No. 3, pp. 188-194, pl. 1, fig. 1).—This is a discussion of the present status of the nun moth situation in Saxony.

Papers on insects affecting vegetables.—A report of progress regarding the sugar beet webworm (*Loxostege sticticalis*), H. O. MARSH (*U. S. Dept. Agr., Bur. Ent. Bul.* 109, pt. 6, pp. 57-70, figs. 15).—This is a preliminary report based upon observations made by the author during portions of the years 1909 and 1910, and nearly all of 1911, while engaged in investigations of the insects affecting sugar beets and truck crops in the Arkansas Valley of Colorado and Kansas. The injury caused by this pest has varied greatly from year to year.

The moths deposit their eggs singly or in rows of from 2 to 5 or more, usually on the underside of the leaf. Under normal conditions each female is capable of depositing at least 200 eggs. The very young larvae eat small holes in the underside of the leaves without cutting through the upper epidermis, but as they increase in size they consume almost the entire leaf with the exception of the larger veins and the petioles. When full grown the caterpillars leave the beets and burrow into the soil, usually close about the infested plant, and spin tube-like cases in which they later pupate. During the summer months the moths issue within a few days.

"In rearing experiments conducted at Rocky Ford, Colo., the average time required from the deposition of the eggs until the moths issued was a little more than a month. The egg stage was observed to vary from 3 to 5 days, the larva stage from 17 to 20 days, and the pupa stage was usually 11 days. These variations were from records of successive generations. So far as the writer has been able to determine, there are 3 generations or 'crops' of webworms in the Arkansas Valley each year. There may be a fourth generation, but if it is not clearly marked and possibly occurs early in the season on weeds such as Russian thistle (*Salsola tragus*) and lamb's quarters (*Chenopodium*

*album*). . . In general the danger period extends from shortly before the middle of June until well into September. The first generation of webworms may be expected at its height of destructiveness during the latter half of June, at a time when the beets are comparatively small and least able to resist the attack."

Blackbirds are said to be important enemies of this pest. True parasites in some cases destroy fully 50 per cent of the overwintered larvae, the braconid *Diosphyrus vulgaris* being one of the most common. Spraying with Paris green at the rate of 3 lbs. to 100 gal. of water to which either 6 lbs. of whale-oil soap or 3 lbs. of lime have been added has proved to be by far the most effective and satisfactory remedy. Zinc arsenate, when used at the rate of 4 lbs. in 100 gal. of water and applied at the rate of 125 gal. per acre, was effective but was noticeably slower than Paris green in its killing effect. It is stated that the cost of labor, material, etc., for spraying sugar beets varied under ordinary circumstances from \$1 to \$2 per acre. The spraying machinery recommended for use in the work is described and illustrated.

The natural enemies of the cotton worm, L. H. GOVEN (Agr. Jour. Egypt, 2 (1912), No. 1, pp. 1-3, pl. 1).—*Calosoma imbricata*, which is parasitized to a very great extent during its larval stage by at least 2 parasitic flies; a Rover beetle (*Poderus* sp.); the gauze-wing fly (*Chrysopa vulgaris*); a solitary wasp (*Eumenes maculosa*); and *Polistes gallica* are the enemies of the Egyptian cotton worm (*Prodenia litura*) here considered and illustrated in colors.

Methods employed in Egypt and elsewhere to check the ravages of the cotton bollworm, G. C. DUDGEON (Agr. Jour. Egypt, 1 (1911), No. 1, pp. 46-46).—This paper relates to *Earias insulana*.

The control of the codling moth, A. L. MELANDER (Washington Sta. Popular Bul. 45, pp. 8, figs. 7).—A brief popular account.

Notes on *Tineina* bred from cotton bolls, J. H. DURRANT (Bul. Ent. Research, 3 (1912), No. 2, pp. 203-208, figs. 3).—These notes relate to the pink bollworm (*Gelechia gossypiella*), *Pyroderces simplex*, and *P. rileyi*.

Lepidoptera heterocera; family Geometridae, L. B. PROUT (Genera Insectorum, 1912, No. 129, pp. 274, pls. 5, figs. 15).—The subfamily Hemitheine is here dealt with.

New Culicidae, F. V. THEOBALD (Novae Culicidae. Wye, England, 1911, pt. 1, pp. 35, figs. 21).—This first part gives descriptions of Culicidae from Uganda, 13 species being described as new to science.

The rôle of the house fly and certain other insects in the spread of human diseases, W. E. BRITTON (Pop. Sci. Mo., 81 (1912), No. 1, pp. 36-49, figs. 5).—An address delivered by the author.

Fruit fly control, W. M. GIFFARD (Hawall. Forester and Agr., 2 (1912), No. 5, pp. 166-170).—This paper adds *Chrysophyllum oliviforme* and *Thevetia nerifolia* to the long list of fruits or seeds infested by the Mediterranean fruit fly.

The petroleum fly in California (*Fallopia petrolei*), D. L. CRAWFORD (Panama Col. Jour. Ent., 4 (1912), No. 2, pp. 687-697, fig. 1).—A discussion of the habits of this insect and of the structure of the larva.

Blood-sucking Diptera in Venezuela, J. M. R. SUBCOUT and R. GONZALEZ RINCONES (Essai sur les Diptères Vénéralants du Venezuela. Paris, 1911, pt. 1, pp. V+320, figs. 65).—This first part of the work deals with the blood-sucking Nematocera.

Blood-sucking Diptera actually known from Venezuela, J. SUBCOUT and R. GONZALEZ-RINCONES (Arch. Par., 15 (1912), No. 2, pp. 248-314, figs. 48).—This paper relates to the studies noted above.

The Siphonoptera of Lima and Callao, E. D. TOVAR Y B. (Bol. Dir. Fomento [Peru], 9 (1911), No. 11, pp. 18-37).—This is a general discussion of the flies which occur in Peru.

The injurious buprestids, F. PICARD (*Prog. Agr. et Vit. (Ed. l'Est Centre)*, 53 (1912), No. 21, pp. 133-139, pl. 1).—Short accounts are given of 6 of the more important buprestids occurring in France, namely, *Sphenoptera gemellata*, *Corticus leucostictus*, *C. undatus*, *Chalcophora mariana*, *Carpodis tenebrionis*, and *Pissina novemmaculata*.

The bark-eating and root-boring beetles (*Coelosterna scabrata* and *Pailotia fastuosa*) of the babul (*Acacia arabica*), E. P. STERBING ([*Indian*] *Forest Rec.* 12, 1912, pp. 2; pls. 2).—Considerable injury in babul plantations in Berar has been due to the attacks of these longicorn and buprestid beetles.

Coleoptera; family Curculionidae, H. WAGNER (*Genera Insectorum*, 1912, No. 159, pp. 109, pls. 6).—This fascicle takes up the subfamily Apioninae. A plate showing the distribution of the genera is included.

The plum curculio, A. L. QUAINANCE and E. L. JENNE (*U. S. Dept. Agr., Bur. Ent. Bul.* 103, pp. 250, pls. 20, figs. 36).—This bulletin gives the results of studies that have been in progress since the spring of 1905. Data have been obtained on the biology of the insect in northern, central, and southern localities in its range of distribution, as in western New York and northwestern Pennsylvania, in the environs of Washington, D. C., and in Georgia. Studies for one season were made in the Ozark region of Arkansas, well toward its limit of occurrence to the Southwest.

The subject is taken up under the headings of classification and synonymy, common names, history, distribution, losses due to the plum curculio, insects likely to be mistaken for it, its description, food plants, life history and habits, seasonal history, percentage of fruit punctured or infested, natural enemies, and remedial measures.

The curculio is indigenous to the eastern United States, and has probably always occupied about its present range of distribution. Investigations conducted show this pest to occur in the humid area in all of the life zones, except the tropical, it having been found as far west as Sterling, Colo. (long. 103°). The authors estimate the annual loss, including cost of remedial operations, resulting from the attack of the curculio, at about \$8,500,000.

The plum curculio feeds upon and oviposits in practically all pome and stone fruits, as the apple, pear, quince, plum, peach, cherry, nectarine, and apricot. Certain wild fruits, such as *Crataegus*, crab apple, etc., are also more or less fed upon, especially when the above mentioned fruits are scarce. There are also records of oviposition in the huckleberry, grape, strawberry, gooseberry, currant, and wild persimmon. It also breeds in black knot.

In comparing the number of eggs deposited by different individuals for the respective localities and the averages of all beetles for a given locality, the authors find a great variation. The final average number of eggs per female for all localities is 144.85, ranging from 1 to 557 eggs. The length of the egg stage ranges from 2½ to 13½ days for the different localities, the averages varying from 3.77 to 9.23 days.

In observations made in Michigan in 1910, the length of the 4 larval instars was 2, 2.4, 2.7, and 4.1 days, respectively. Comparatively few beetles emerge from the soil within 3 weeks from the time of entering as larvæ. The great majority of the beetles appear during the fourth and fifth weeks and by the close of the sixth week emergence has practically ceased. At Barnesville, Ga., the average number of days for the larvæ in the soil before pupation was 16.08 as against 12.03 in Michigan. In Georgia the average time spent by the adults in the ground before emerging was 5.62 days. The average time 37 individuals spent in the soil was 30.89 days. Of a total of 1,033 larvæ, 694 pupated within 1 in. of the surface, and 1,019 within 2 in. of the surface. The several averages of time for complete transformations in the individual records show a range of

from 36.97 to 67.23 days, the former from the insectary records of 1906 at Washington and the latter from Barnesville, Ga., in 1910.

The records indicate that the curculio feeds rather more at night than in the day and that egg laying goes on at about an equal rate during night and day. "It appears that the curculios usually first appear on the trees each season at nearly the same time relative to the advancement of fruit trees, namely, during or a little before the blooming period of apples or shortly after the petals of peaches, pears, and plums have fallen. In some seasons, however, the curculios may appear as early as the blooming period of the plum or be retarded until after apples have shed the petals. Thus it appears that the beetles are affected by temperature to a different degree than are the plants on which they live." A second generation is said to have been reared to the adult stage at Barnesville, Ga., in 1910.

The plum curculio is said to be attacked by several species of parasites, among which the authors consider *Anaphoidea conotrachei*, which parasitizes the eggs, and *Triaspis curculionis*, *T. curculionis rufus*, *Theraptichus conotrachei*, *Microbracon mellitor*, *Myiophasia ænea*, *Cholomyia inaquipes*, and *Pegomya fusciceps*. In discussing remedial measures a historical account of the earlier methods first given is followed by a consideration of the relative value of collecting, spraying, and cultivation for the destruction of the pupæ.

"Considering the several records of jarring on peach given above, it would appear that this practice, on the whole, is not warranted from the benefits derived. Notwithstanding the large total of beetles caught in the course of the Barnesville experiment, averaging 20.81 per tree, there was a lessening of infestation of only about 10 per cent, as compared with the check. . . .

"The records given of results of spraying apples for the control of the curculio indicate clearly that the injuries of the pest may be in all cases greatly reduced, although the degree of benefit varies widely. It is apparent that account must be taken of other factors, as the relative abundance of the insects as compared with the amount of fruit present on the trees. With a small fruit crop and abundance of curculios, the most thorough spraying will not serve to bring through a satisfactory amount of sound fruit. . . . The degree of success in spraying varies with the abundance of the insects, and where the latter are numerous thorough treatments seem to fail to yield a desired freedom from injury." A schedule consisting of 4 sprayings is recommended for apple orchards and should control the plum curculio as well as numerous other insect enemies.

A combination of arsenate of lead and self-boiled lime-sulphur wash, while resulting in important chemical changes, has in actual practice resulted in a spray which appears to be perfectly safe to peach foliage and fruit. Experience during the past 3 years with this combined spray on peaches under varying climatic conditions seems to leave no doubt that by this combination the injurious properties of the arsenate of lead, as when used alone, are so reduced as to be practically negligible. "More data are needed to show the protection from curculio which will follow spraying plums and cherries, though this will without doubt be quite as marked as with peaches. The same spraying schedule indicated for early peaches will be suitable for plums and cherries, and the arsenical should be used in the self-boiled lime-sulphur wash."

A bibliography of economic literature consisting of 23 pages is appended. **Texas bee keeping**, L. H. SCHOLL (*Tex. Dept. Agr. Bul. 24, 1912, pp. 142, figs. 115*).—This bulletin has been prepared by an experienced bee keeper to meet the requirements of those who desire complete practical instructions concerning bee keeping.

**Comb honey:** G. S. DEMUTH (*U. S. Dept. Agr., Farmers' Bul. 508, pp. 47, Apr. 20*).—This bulletin presents an analysis of the best practice and points out some essentials to the production of maximum crops of honey of the best grades.

The subject is taken up under the headings of apparatus for comb-honey production, manipulation of the bees, and caring for the crop.

**A successful queen-cage candy made without honey,** A. C. MILLER (*La. Planter, 49 (1912), No. 11, p. 185*).—A candy which contains no honey has been prepared for use in queen cages from the following constituents: Granulated sugar, 5 lbs.; coffee A sugar, 1 lb.; glucose, 1 lb.; water, 1½ pt.; and 1 level teaspoonful of cream tartar. After mixing, the ingredients are boiled without stirring until the temperature reaches 240° F. for summer use, or 232° for winter use, then removed from the fire, stirred until thickened, and run into molds, feeders, or cages.

It is stated that queens have been successfully shipped to England and that full colonies shaken from their combs have been shipped with no other food than this candy with the best of results.

**South African "fertile-worker bees,"** G. W. ONIONS (*Agr. Jour. Union So. Africa, 3 (1912), No. 5, pp. 720-728*).—This is a report of personal observations.

**South African fertile-worker bees and parthenogenesis,** D. S. VAN WARMELO (*Agr. Jour. Union So. Africa, 3 (1912), No. 6, pp. 786-789*).—This is a critical review of the article noted above.

**Wild honey: With notes on the Moka bee,** E. N. MARAIS (*Agr. Jour. Union So. Africa, 3 (1912), No. 6, pp. 790-795*).—In an appended note by C. B. Hardenberg it is stated that the species here considered, namely, the larger Moka bee, is closely allied to, if not identical with, *Trigona clypeata*.

**A new encyrtid (*Encyrtus sericophilus*) beneficial to sericulture,** A. CONTE (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 18, pp. 1182, 1183*).—The encyrtid here described as new to science parasitized the greater number of the pupæ of a tachinid parasite (*Tricholyga sorbillans*) of the silkworm received by the author from Tan Chau, Indo-China.

**The life history and bionomics of some North American ticks,** W. A. HOOKER, F. C. BISHOPP, and H. P. WOOD (*U. S. Dept. Agr., Bur. Ent. Bul. 106, pp. 239, pls. 15, figs. 17*).—This is a report of studies conducted in large part in the field laboratory of the Bureau of Entomology at Dallas, Tex., from 1907 to 1910. The first part of the bulletin is devoted to an account of ticks in general, including systematic position and classification; collecting, preserving, and mounting; economic importance; history of the biological study of ticks; geographical distribution; general life history; habits; multiplication; locomotion and dissemination; seasonal history; methods employed in studies of ticks; natural control; and artificial control.

The life history and bionomics of 19 forms are considered. Under each species the authors present a description of the size and coloration of the various stages, their host relationship, geographical distribution, observations of the length of the various stages, number of eggs deposited, etc., based upon temperature readings, a summarized account of the life cycle, economic importance, and natural and artificial control. The species and varieties thus considered are the fowl tick (*Argas miniatus*), spinose ear tick (*Ornithodoros megnini*), black-legged tick (*Ixodes scapularis*), rotund tick (*I. kingi*), rabbit tick (*Haemaphysalis leporis-palustris*), bird tick (*H. chordeilli*), brown dog tick (*Rhipicephalus sanguineus*), North American cattle tick (*Margaropus annulatus*), Australian cattle tick (*M. annulatus australis*), gopher-tortoise tick (*Amblyomma tuberculatum*), iguana tick (*A. dissimile*), Gulf Coast tick



(*A. maculatum*), lone star tick (*A. americanum*), cayenne tick (*A. cajennense*), rabbit Dermacentor (*Dermacentor parumaperius marginatus*), Rocky Mountain spotted-fever tick (*D. venustus*), Pacific Coast tick (*D. occidentalis*), American dog tick (*D. variabilis*), and tropical horse tick (*D. nitens*).

A list of bibliographical references is appended.

Rocky Mountain spotted fever, W. C. RUCKER (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts.*, 27 (1912), No. 36, pp. 1465-1482).—This summarized account includes a bibliography of 77 titles.

The origin and significance of parasitism in the Acarina, H. E. EWING (*Trans. Acad. Sci. St. Louis*, 21 (1912), No. 1, pp. 70, pls. 8).—"We have very strong evidence indicating that the parasitic habit has originated independently at least 11 times in the phylogeny of the Acarina. Among the zoophagous parasites the parasitic habit has been developed from 3 different types of free living Acarina: (a) Predaceous forms, (b) scavengers, (c) forms living upon the juices of plants. . . . As is usually the case with other parasites, we generally find here a gradual increase in the state of degeneration as we follow the advancing stages of parasitism from its origin among free types. . . . We find in the Acarina a process of degeneration which in its completeness is seldom obtained in the animal kingdom."

#### FOODS—HUMAN NUTRITION.

Sewage-polluted oysters as a cause of typhoid and other gastro-intestinal disturbances—a study of an epidemic and of certain individual cases, G. W. STILES (*U. S. Dept. Agr., Bur. Chem. Bul.* 156, pp. 44, pls. 4, figs. 7).—According to the author's conclusions from his investigations and a summary of data, "there is undisputed evidence to show that infected oysters, clams, mussels, scallops, and other shellfish may cause typhoid fever and other gastro-intestinal disturbances when consumed by susceptible individuals."

"The epidemics of typhoid fever, due to ingestion of polluted sea food, have in most instances been traced to shellfish floated in polluted water, although there is also evidence that oysters and other shellfish, grown in polluted waters and directly consumed without transplanting for a time in pure waters, may be the source of typhoid infection."

A full account is given of investigations which led to the conclusion that Rockaway oysters were wholly responsible for cases of typhoid fever and gastro-enteritis (diarrhea) following a banquet. There were 17 well-defined cases of typhoid fever, with 1 death, and 83 cases of gastro-enteritis traced directly to such oysters from Jamaica Bay, floated at Indian Creek, near Canarsie, Long Island, N. Y., with 10 additional cases of typhoid and 16 cases of diarrhea traced to oysters from the same locality and in part from the same lot as those furnished for the banquet.

"This investigation comprises a complete study of all the factors which would materially contribute to typhoid infection. Each item of the menu served at the . . . banquet was carefully considered, and the Rockaway oysters served were the only articles of food consumed by all of those who had typhoid or gastro-enteritis following this banquet."

Bacteriological studies showed sewage pollution in Jamaica Bay, and "typhoid bacilli were isolated in pure culture after 7 and 21 days from oysters which had been floated at Inwood, Long Island, N. Y., . . . and kept out of water in storage at 39° F. Organisms of the *Bacillus coli* and *B. paratyphosa* groups were also isolated from oysters floated at Indian Creek. . . . They were probably the cause of the gastro-enteritis cases following the . . . banquet."

The diarrhea or bowel trouble referred to, according to the author's conclusions, can probably be ascribed to the presence of paratyphoid bacilli (said by

some authors to be indistinguishable from or closely allied to the Gaertner bacillus in the oysters served at the banquet. "It is apparent that the disease was due to bacterial infection, arising from the multiplication of the organisms in the body after ingestion, and not to 'ptomaines,' as suggested by some.

"Ptomaines are formed most commonly during the decay of animal matter. They are essentially the decomposed animal tissue, not excretions of the bacteria, although the bacteria are responsible for the decomposition. Such decomposition does not occur usually in the body, even in animal matter taken as food. In abnormal conditions, if food remains in the body until putrefied, ptomaines may be formed in the intestinal contents. When decomposed food containing ptomaines is received in the digestive tract, or originally good food decomposes there, the mucous membrane and blood may take up ptomaines from this decomposed food, which ptomaines affect the tissues like other poisons.

"Substances of quite varied chemical constitution are classed under the head of ptomaines solely on account of their origin in proteid decomposed by bacterial action. Bacterial toxins are to be distinguished from ptomaines. Toxins are substances which are or have been a part of the body of the bacteria; some are secretions from the germ, others are liberated only in case of the death and breaking down of the germ itself. In this latter class is the toxin of typhoid fever, which is therefore particularly different in its origin and action from ptomaines. The toxins are much more poisonous than ptomaines and each one is produced by a specific germ.

"Some cases of sickness due to food have been classed as ptomaine poisoning, when this cause was later discovered to be the ingestion in the food of a particular bacillus which multiplied in the body and by its toxin produced intestinal and other disturbances. Such cases are not ptomaine poisoning but may be classed as food poisoning."

Studies of meat corned by the Morgan process, K. VON KARAFFA-KORBUTT (*Ztschr. Unterzuch. Nahr. u. Genussmit.*, 24 (1912), No. 6, pp. 365-385).—From an experimental study of this method of pickling meat and a summary of published data, general conclusions were drawn including, among others, the following:

The method of pickling the meat is not less important than its further treatment. Ripening should take place in rooms with a temperature of about 0° C. It requires from 4 to 6 weeks in order that the osmotic processes may be completed and the meat be uniformly salted. Storing corned meat for a sufficient time at a low temperature improves its keeping quality. The relation between the temperature of storerooms and the spoiling of pickled meat lies in the symbiosis of different bacteria which gain access to it. Low temperature favors the development of yeast forms and acidophylic bacteria and lessens the growth of septic bacteria, and it is therefore a favorable factor in keeping quality.

On the falsification of the rice, S. SATO (*Yakugakuzasshi (Jour. Pharm. Soc. Japan)*, 1912, No. 361, pp. 217-241, figs. 3).—It is stated that fine gravel and siliceous earth are added to rice as an adulterant as well as to assist in removing the hulls. The percentage of ash in such cases may be as high as 6.36 per cent, while good rice should have less than 1 per cent of ash.

The milling quality of Washington wheats, III, R. W. THATCHER (*Washington Sta. Popular Bul.* 39, pp. 8).—A summary of data previously noted (*E. S. R.* 25, p. 867).

How to make bread from soft wheat flours, G. A. OLSON (*Washington Sta. Popular Bul.* 47, pp. 4, fig. 1).—Directions are given for preparing yeast and for mixing and handling the dough from Washington soft wheat flours.

The author insists that ingredients should be weighed. Directions are given for determining the amount of water required by different flours, and some data presented showing the influence of water and kneading on the size and texture of the loaf. According to the data presented, there is always an increase in the weight of bread and volume of loaf with a reasonable increase of water used in mixing the dough, while at the same time there is a reduction in the time required for fermentation and baking. When straight doughs are compared with those involving kneading "it is observed that the weight of the loaf is practically the same in all cases when like amounts of water were used. The largest weights were obtained where the flour was kneaded the second time." The smallest volume was obtained in the case of straight dough where the minimum amount of water (52.5 per cent) was used, and the largest volume in the case of lightly handled dough with a second kneading where 65.5 per cent of water was used.

**Bulgarian bread, a little known dough fermentation** (*Pure Products*, 1912, No. 7, pp. 384, 385).—The bread here described is made of fine wheat flour and leavened by the activity of a bacillus of the Coli-group, called *B. macedonicus*. The bread is said to have a pleasant taste and a fine, fruity aroma.

**Concerning the physiological effect of chicory infusion**, J. PARCHTNER (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 6, pp. 241-250, *dyma*. 6).—From experiments with a rabbit and dogs the author concludes that chicory exercises a noticeable though not very great stimulating effect upon the digestive apparatus and the circulation of the blood, and that this rather than the taste explains the general use of this material as a food accessory. He does not believe that under normal conditions there is any reason for considering chicory harmful.

**Food inspection decision** (*U. S. Dept. Agr., Food Insp. Decision* 143, p. 2).—The use of copper salts in the greening of foods is declared an adulteration under the Food and Drugs Act after January 1, 1913.

**Sulphite in sugar goods**, H. WITTE (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 24 (1912), No. 7, pp. 463-465).—The occurrence of sulphurous acid in candies is reported and discussed.

**The art of good living**, E. RICHARDIN (*L'Art du Bien Manger. Paris, 1910*, pp. XVI+a+926, pls. 51, figs. 51).—In this volume, which bears the subtitle *French Cookery from the Fourteenth to the Twentieth Century*, a large amount of historical and general data regarding food and its preparation is summarized and many recipes are included.

**Good living** (*Pour Bien Manger. Paris, 1912*, pp. XXXII+340, pls. 24, figs. 43).—This volume discusses at length cooking schools, kitchen equipment, service, and other matters of housekeeping, and gives a large number of recipes for preparing different foods. Data are also summarized regarding the adulteration of food.

**Beriberi caused by fine white flour**, J. M. LITTLE (*Jour. Amer. Med. Assoc.*, 58 (1912), No. 26, pp. 2029, 2030).—A diet consisting almost exclusively of fine white flour, tea, and molasses, made necessary by shortage of food supplies in Newfoundland and Labrador, resulted in beriberi, according to the author's experience.

**Substitution of whole wheat flour is recommended**. He believes that the more the diet is restricted to flour, the more necessary it is to have whole wheat flour.

**Preparation from yeast and certain foodstuffs of the substance the deficiency of which in diet occasions polyneuritis in birds**, C. FUNK (*Jour. Physiol.*, 45 (1912), No. 1-2, pp. 75-81; *qds. Jour. Chem. Soc. [London]*, 1912

(1912), No. 599, II, p. 856).—A substance which appears to be a pyrimidin base, forming a constituent of nucleic acid, was isolated from yeast, milk, brain, and possibly lime juice. From 0.02 to 0.04 gm. in food prevented polyneuritis in pigeons.

The influence of meal hours upon energy elimination in man, J. AMAR (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 8, pp. 528-531; *Jour. Physiol. et Path. Gén.*, 14 (1912), No. 2, pp. 298-308; *abs. in Zentbl. Expt. Med.*, 1 (1912), No. 14, pp. 684, 635; *Zentbl. Physiol.*, 26 (1912), No. 7, pp. 351, 352).—In these experiments the effect on the respiratory quotient and oxygen consumption of carbohydrate as compared with nitrogenous food, and of a constant amount of work performed at different intervals after ingestion of food was noted.

The author concludes that the performance of a given amount of work is 4.5 per cent more difficult and that the energy is available much more slowly on a nitrogenous than on a carbohydrate diet.

The influence of dry and moist air on gaseous metabolism, H. MURSCHEHAUSEN and H. HIDDING (*Biochem. Ztschr.*, 42 (1912), No. 5, pp. 357-371; *abs. in Jour. Chem. Soc. [London]*, 102 (1912), No. 599, II, p. 850).—Experiments were made to determine the effect of humidity on gaseous metabolism, using guinea pigs.

At 5° C. there was 76.5 per cent more of carbon dioxide in dry air, and 82.8 per cent more in moist air, than at 21°. There was 18.7 per cent less carbon dioxide in dry air, and 7.1 per cent more in moist air, at 35° than at 21°. Carbon dioxide metabolism at 21° is greater in dry than in moist air.

The author's explanation of the observed facts is that the lower the temperature, the greater the degree of saturation with water vapor, and consequently the less the loss of body heat. Increase of moisture diminishes carbon dioxide production, while decrease of moisture has the opposite effect. At higher temperatures, increase in moisture content up to the point of saturation is associated with increased body temperature, indicating increased metabolism. The results in relation to size of body surface are discussed.

## ANIMAL PRODUCTION.

The nature, origin, and maintenance of life, E. A. SHAFER (*Nature [London]*, 90 (1912), No. 2236, pp. 7-19; *Sci. Amer. Sup.*, 74 (1912), Nos. 1918, pp. 221-223; 1919, pp. 226, 227; 1920, pp. 254, 255).—This is the inaugural address of the president of the British Association for the Advancement of Science, 1912, and discusses the fundamental principles governing the origin, growth, and maintenance of animals and plants as revealed by physical, chemical, and biological studies.

The process of reproduction in organisms, C. M. CHILD (*Biol. Bul. Mar. Biol. Lab. Woods Hole*, 23 (1912), No. 1, pp. 1-39).—A discussion of the reproductive power of both somatic and germ cells.

It is stated that the experimental data of recent years do not support the germ plasma hypothesis of Weismann. The view is also expressed that our theories of heredity, instead of being based solely on the phenomena of sexual reproduction, must find their basis for analysis and interpretation in the simpler forms of asexual and experimental reproduction. Heredity is defined as the capacity of the physiologically or physically isolated part for regulation.

The interstitial cells and the supposed internal secretion of the chicken testis, ALICE M. BOBING (*Biol. Bul. Mar. Biol. Lab. Woods Hole*, 23 (1912), No. 3, pp. 141-153, figs. 9).—The object of this work was to find evidence of the reproductive organs as a cause for the development of secondary characters,

the male fowl being an especially good animal because of the extensive development of the characters to be studied.

The histological studies revealed no cells in the interstitial tissue in the young or old chicken testis with the cell bodies differentiated from the connective tissue fibers. The differences in shape depended on the mechanical pressure conditions. The difference in staining capacity of the nuclei was not considered a basis for cell classification. The fat in the testis was thought to be brought there by the circulation and deposited, instead of being formed by the interstitial tissue. No evidence was found in this study which would indicate an internal secretion of any kind formed by interstitial tissue. Therefore, it is concluded that there is no interstitial cell in the testis of the domestic chicken in the sense that the term has been previously used.

The iron content of the urine of domesticated animals, M. REICH (*Das Harnwesen der Haustiere. Inaug. Diss., Univ. Rostock, 1911, pp. 41; rev. in Zentbl. Agr. Chem., 41 (1912), No. 4, pp. 272-275*).—In normal feeding the amount of iron excreted per kilogram of urine was as follows: Dogs from 1.1 to 1.42, swine from 1.3 to 1.58, oxen 0.918, goats 0.408, horses from 0.51 to 0.83, and sheep from 0.73 to 1.34 mg. The amount excreted per day for animals was as follows: Dog 0.33, swine 5, oxen 12.55, goats 0.5, and sheep 1 mg. As in the case of man the iron was in inorganic compounds.

\*The discordant results of many investigators is thought to be due to imperfect methods of determination. The author used a modification of the methods of O. Walter and H. Neumann.

Department of experimental evolution, C. B. DAVENPORT (*Carnegie Inst. Washington Year Book, 10 (1911), pp. 78-87, pl. 1*).—A report of progress made on problems in heredity, evolution, and genetics, including work on the following topics: Heredity in poultry, inheritance of double horn in sheep, reciprocal crosses in relation to sex, theory of pure lines, quantitative studies of selective elimination, influence of becoming feral on the development of the nervous system of the domestic animal, and the relation between heredity and the chemical action of pigment.

The problem of the improvement of domesticated species, H. BOULARD (*Bull. Econ. Indo-Chine, n. ser., 15 (1912), No. 37, pp. 479-491*).—A discussion of methods of selecting breeding animals, and brief notes concerning the ancestry of cattle.

Production of pure homozygotic organisms from heterozygotes by self-fertilization, H. S. JENKINGS (*Amer. Nat., 46 (1912), No. 548, pp. 487-491*).—The author illustrates with mathematical formulas how organisms may become homozygotes when self-fertilized for many generations, if the number of separable inheritable characters is not large.

The formation of condensed correlation tables when the number of combinations is large, J. A. HARRIS (*Amer. Nat., 46 (1912), No. 548, pp. 477-486*).—The author's aim in this article is to show how, in the case of relationships involving a very large number of combinations, the chief advantages of the correlation, but not the contingency, surface may be even more easily realized than in the method already described (*E. S. R., 25, p. 771*). Illustrations are given of this rapid method of carrying out the routine of a widely applicable statistical process.

Concerning a specimen of *Bos primigenius*, J. FELIX (*Sitzber. Naturh. Gesell. Leipzig, 37 (1910), pp. 35-38, pl. 1*).—This contains a description of measurements of a perfect skull of *B. primigenius*.

Progress in breeding in the State of Sao Paulo, Brazil, L. MISON (*Ann. Gembloux, 22 (1912), No. 8, pp. 453-508, pls. 24*).—A general account of the

live-stock industry of Sao Paulo. Methods of feeding, breeding, and management are described, and a list of the principal forage plants and their yields per acre is also given.

Live-stock industry [of southern India], J. DE OLIVEIRA (*Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 241, pp. 211, 212).—This contains some statistics on the rapid development of the live-stock industry in southern India. This is attributed to various causes, chief of which are the greatly increased feeding resources resulting from extensive irrigation and the successful work of veterinarians in checking diseases to which cattle are subject.

Managing and equipping a two-hundred-acre stock farm, M. P. JARNAGIN (*Trans. Agr.*, 1 (1912), No. 4, pp. 147-161, figs. 10).—A system of live-stock farming is outlined, which includes data as to the amount of feed required for farm animals, the rotation of crops, and other points relating to the successful management of a live-stock farm.

Our knowledge of the carbohydrates in the economy of the animal, R. LÉPIN (Rev. Gén. Sci., 23 (1912), No. 12, pp. 463-468).—This is a historical résumé of the growth of the knowledge on carbohydrate metabolism.

The effect of sugar on metabolism, A. GOVIN and R. ANDOUARD (*Compt. Rend. Soc. Biol. [Paris]*, 72 (1912), No. 26, pp. 113-115).—An experiment with a 1-year-old heifer, which lasted for 7 weeks. During the whole period the daily ration consisted of 800 gm. of peanut cake and hay ad libitum, and, in addition, during the first 3 weeks, potatoes; during the next 2 weeks one-half of the potatoes was replaced with carob beans; and during the last 2 weeks carob beans equal in nutrients to the potatoes fed at first. During the second period the potatoes and carob beans furnished 128 gm. saccharose daily, and during the third period the carob beans furnished 218 gm. saccharose daily.

There was a great reduction in the secretion of urine and urinary nitrogen and in general in the percentage of nutrients digested on addition of saccharose to the rations. The daily increase in weight was for the first period 501 gm., for the second period 1,000 gm., and for the third period 857 gm. The experiment will be repeated with a younger animal.

Investigations on the meadow conditions of German Southwest Africa, W. HEERING and C. GRIMME (*Arch. Deut. Landw. Gesell.*, 1911, No. 197, pp. 143).—A study of the soil types and geographical distribution of grasses and forage plants. Analyses and digestion coefficients of the following species are reported: *Aristida uniplumis*, *A. congesta*, *A. stipiformis*, *A. namaquensis*, *Cynthia hererensis*, *Crotalaria diversistipula*, *Tribulus terrestris*, *T. inermis*, *T. pechuelii*, *Andropogon contortus*, *A. papillosus*, *Panicum trichopus*, *Sporobolus indicus*, *S. nebulosus*, *Eragrostis trichophora* var., *E. porosa*, *E. laevissima*, *Cynodon dactylon*, *Antheophora hochstetteri*, *Fingerhuthia africana*, *Asparagus* sp., *Boerhaavia pentandra*, *Albizia anthelmintica*, *Acacia hebeclada*, *A. hererensis*, *A. piraña*, *Rhynchosia gibba*, *Peltophorum africanum*, *Commiphora africana*, *Croton gratissimus*, *Flueggea aovata*, *Heeria mucronata*, *Rhus ciliata*, *R. albomarginata*, *Helinus ovatus*, *Grewia bicolor*, *G. olukonda*, *Combretum hererense*, *O. primigenium*, *Royena pallens* (?), *Ehretia hottentottica*, *Bouthea pinnatifida*, *Solanum incanum*, *Petalidium physaloides*, *Blepharis edulis* (?), *Cucumis prophetarum* var., *Tarchonanthus camphoratus*, *Dicoma anomala*, *Adorella auriculata*, *Cyperus usitatus*, *Citrullus vulgaris*, *Citrullus* sp., *Schmidtia pappophoroides*, *Poponarthria tuberculata*, *Leucosiphara bainesii*, *Hermistictia dammarensis*, *Oleome rubella*, *Polanisia tüderitziana*, *Lotononis* sp., *Tephrosia purpurea*, *Rhigozum trichotomum*, *Catophractes alexandri*, *Pappophorum ascheroideis*, *P. scabrum*, *Salsola aphylla* (?), *Zygophyllum affine microcarpum*, *Alstonia capensis*, *Leucas pechuelii*, *Setaria verticillata*, *Chloris*

*virgata*, *Atriplex vesicaria*, *Kochia salsoloides* (?), *Anisostigma schenckii*, and *Tamarix usneoides*.

The common names of these plants are given in German.

**Report of the animal husbandman, E. G. RITZMAN** (*Porto Rico Sta. Exp. 1911, pp. 40-44*).—This contains a brief account of zebu crosses, African wool-less sheep, and other station work in relation to animal husbandry.

Three years' investigation indicates that good silage can be made, and that native stock as well as the imported animals will eat it readily. Corn, whole cane, cane tops, and malojilla or Para grass have all given satisfactory results when fed as silage. Para grass when put in the silo was so light that it did not make good silage unless heavily ballasted. Six ft. of cut corn silage made a satisfactory ballast.

It was found that calcium chlorid could be used profitably as a supplement to bone meal in rations deficient in calcium. Middlings, shorts, and other mill feeds poor in calcium were too high in magnesium, and this excess of magnesium retarded assimilation and increased the cost of growth unless the effect was neutralized by calcium. Comparisons of calcium chlorid with tricalcium phosphate (bone meal) showed that there was only a small variation among individual pigs in utilization of calcium chlorid whereas there was a wide difference among individual pigs as regards utilization of bone meal.

**Silos and silage, R. C. ASHBY** (*Washington Sta. Popular Bul. 46, pp. 4*).—This discusses the advantages of including silage in the ration for live stock, and gives estimates on the cost of raising silage crops and building silos.

**Feeding stuffs inspection for 1912, B. E. CURRY and T. O. SMITH** (*New Hampshire Sta. Bul. 158, pp. 30*).—This contains the results of the annual feeding stuffs inspection, including analyses of 267 samples of cotton-seed meal, linseed meal, beef scraps, bone meal, cob meal, stredded wheat waste, corn-oil meal, buckwheat middlings, distillers' dried grains, malt sprouts, dried beet pulp, rye grains, gluten feed, hominy feed, wheat bran, wheat middlings, alfalfa meal, and proprietary mixed feeds. A discussion showing the expansive nature of low-grade feeds is also given.

**Feeding stuffs, F. MACH** (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb. 1911, pp. 18-32*).—Analyses are reported of peanut cake, coconut cake, linseed cake, maize-oil cake, poppy cake, palm-nut cake, rape cake, sesame cake, soy-bean cake, wheat bran, wheat germ, distillers' slop, maize, fresh unshelled acorns, dried shelled acorns, dried sugar beet leaves, meat meal, fish meal, potato flakes, sugar-beet flakes, and apple pomace.

**The microscopic identification of cattle foods, G. H. CHAPMAN** (*Massachusetts Sta. Bul. 141, pp. 4-71, figs. 52*).—This bulletin contains brief descriptions of the characteristics of grains and grain products, legumes and oil seeds, weed seeds, and miscellaneous products, condiments, chemicals, and miscellaneous substances commonly found in commercial feeding stuffs, so that these ingredients can be easily identified by means of the microscope.

The text is accompanied by figures showing microscopic sections of cells, starch grains, etc. An analytical key to some commonly occurring starches is included.

**Corn silage and roots for steers, J. W. WILSON** (*South Dakota Sta. Bul. 137, pp. 354-367, figs. 11*).—This bulletin gives the results of 2 experiments in feeding corn silage to steers.

In the first experiment 20 yearling steers were divided into 5 lots of 4 each and fed for 90 days in order to test silage as a sole ration for wintering steers, as follows: Lot 1, silage from green corn cut when in the dent stage; lot 2, one-half as much silage as was consumed by lot 1 and all the hay they would eat; lot 3, silage from corn fodder cut at the same time as for lot 1 but put

into silo 10 weeks after it was cut; lot 4, millet hay cut when green and before seed matured; and lot 5, corn fodder from the field.

In the second experiment 24 yearling steers were divided into 6 lots of 4 each and fed for 120 days corn and oil meal 10:1, as a basal ration, and in addition the following: Lot 6, silage; lot 7, one-half as much silage as lot 1 and what hay they would eat; lot 8, sugar beets and hay; lot 9, mangel wurzel beets and hay; lot 10, stock beets and hay; and lot 11, hay.

The following table gives the comparative gains made in these tests:

Comparative gains of yearling steers on silage with and without supplements.

Experiment 1.			Experiment 2.			
Lot.	Average weight at beginning.	Average daily gain per head.	Lot.	Average weight at beginning.	Average daily gain per head.	Fork produced following steers.
	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.
1.....	773	2.40	6.....	807	2.36	160
2.....	757	1.25	7.....	835	2.54	224
3.....	780	1.94	8.....	793	2.55	203
4.....	786	.63	9.....	773	2.61	190
5.....	765	1.76	10.....	798	2.39	187
			11.....	837	2.28	207

Experiments on the feeding of cattle, C. B. JONES (*Univ. Col. Wales, Agr. Dept. Bul. 1* [1912], pp. 1-12).—In an experiment with 12 Hereford and 8 Welsh Black 3-year-old cattle for 16 weeks the average daily gain per head for the lot fed 6 lbs. cotton-seed cake and barley meal daily was 1.55 lbs. against 1.6 lbs. for the lot fed 3½ lbs. of the same concentrates daily, the supplementary feeds in each case being straw, hay, and 50 lbs. of roots. In another experiment, in which the cattle were fed rations similar to the last-mentioned lot for 16 weeks, those allowed free access to water gained 1.92 lbs. each daily against 0.87 lbs. for those receiving no water except that contained in the feed.

Loss in weight of fattened cattle, HERTER and WILSDORF (*Arch. Deut. Landw. Gesell.*, 1911, No. 182, pp. 42; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 970, 971).—This gives the loss in weight of calves, bulls, and cows at different ages when shipped from all parts of Germany to the Berlin cattle show.

The Bordelaise breed of cattle, G. LAFFORGUE (*Vie Agr. et Rurale*, 1912, No. 13, pp. 331-334, figs. 4).—The characteristics of this French breed of cattle are illustrated and described.

The development of Bavarian cattle breeding, O. KRONACHER (*Die Entwicklung der Bayerischen Rindviehzucht. Hannover*, 1911, pp. 96, fig. 56; *abs. in Fühling's Landw. Ztg.*, 60 (1911), No. 19, p. 680).—A history of cattle breeding in Bavaria since the organization of the agricultural union a century ago. Swiss cattle, J. DE LHARPE (*Ann. Gembloux*, 22 (1912), No. 7, pp. 424-435, pls. 3).—The Swiss breeds of cattle are illustrated and described.

Sheep and wool for the farmers.—I, The cross-breeding of sheep, J. W. MATHEWS (*Dept. Agr. N. S. Wales, Farmers' Bul. 53*, 1912, pp. 126, figs. 56).—This bulletin treats of the classification of sheep breeds, principles of breeding, influence of climate upon breed, suitability of the breeds for different localities, wool production, the raising of early lambs, management of sheep, cross-bred or Merino stock, and the standardization of the cross-breeds.

Sheep breeding in East Friesland, GROSS (*Illus. Landw. Ztg.*, 32 (1912), No. 49, pp. 457-459; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel.*



and Plant Diseases, 3 (1912), No. 8, p. 1817).—The characteristics of the East Friesland milk sheep are discussed, and there is a general account of the recent efforts to improve the breed.

A comparison of sheep branding paints, C. J. OVIATT (*Wyoming Sta. Bul.* 93, pp. 8, figs. 6).—This bulletin reports the results of tests for the purpose of ascertaining the comparative efficiency, durability, and scouring-out qualities of several commercial brands of sheep branding paints.

Paints remained a greater length of time on downs and fine wools than on coarse wool. The fineness of the wool had no effect on the scouring-out qualities of the paints. It is stated that if all wool growers would use a scourable paint the labor of clipping brands from the fleeces in the mills would be eliminated and this saving could be added to the price of wool.

"A paint made of Venetian red or lamp black as pigments mixed with linseed oil is much more durable than the prepared paints tested. The right consistency may be obtained by the addition of turpentine."

Heredity in goats, C. J. DAVIES (*Mendel Jour.*, 1912, No. 3, pp. 104-116, figs. 6).—Data are presented from herd books of the British Goat Society on the inheritance of horns and hair.

Dried yeast as a food for fattening swine, W. VÖLK (*Ztschr. Spiritusind.,* 35 (1912), Nos. 1, pp. 1, 2; 2, pp. 14, 15; 3, pp. 25, 26; 4, p. 38; 5, pp. 48, 49; *Wohnschr. Brau.*, 28 (1911), Nos. 45, pp. 537-541; 46, pp. 550-556, figs. 3; *abn. Chem. Zentbl.*, 1912, I, No. 7, p. 515).—The average daily gain of 9 pigs for 7½ months on a ration of dried yeast, potatoes, and barley was about 0.77 kg. (1.69 lbs. per head per day at a cost of 0.545 marks (13 cts.) per day. Analyses of feeds and the slaughter weights of different organs are given.

Swine fattening experiments with soy-bean meal, E. HASELHOFF (*Fühling's Landw. Ztg.*, 61 (1912), No. 12, pp. 401-414).—Soy-bean meal was found to be somewhat cheaper than barley meal as a feed for swine when given with a variety of other feeds. Studies of the fat showed that soy-bean meal had no great effect on the index of refraction, saponification number, or iodine number.

Fattening pigs, J. W. WILSON (*South Dakota Sta. Bul.* 136, pp. 339-350, fig. 1).—To determine the comparative value of buttermilk, sweet skim milk, and sour skim milk when fed in connection with corn, experiments were conducted during the summers of 1910 and 1911. In 1910 24 pigs averaging 32 lbs. each were fed for 62 days rations consisting of about 2½ lbs. of milk for every pound of shelled corn. An equal number of pigs averaging 36 lbs. each were fed 62 days in 1911, about 3 lbs. of milk for every pound of shelled corn. Each year a lot was fed on shelled corn without milk as a check lot. All pigs had an abundance of blue grass pasture. The pigs consisted of pure bred Poland-Chinas, Duroc-Jerseys, Berkshires, and Hampshires, and grade Duroc-Jerseys. Averaging both experiments, the lot fed shelled corn made a daily gain of 1.04 lbs. each, and consumed 4.68 lbs. corn per pound of gain. Those fed shelled corn and sweet skim milk gained 1.65 lbs. each daily, requiring 3.12 lbs. of grain and 8.59 lbs. of milk per pound of gain. The lots on corn and sour skim milk gained 1.64 lbs. each daily, requiring 3.18 lbs. grain and 8.73 lbs. milk per pound of gain. The corn and buttermilk lots made a gain of 1.66 lbs. each daily, requiring 3.15 lbs. grain and 8.64 lbs. milk per pound of gain.

Another experiment was conducted to determine the practical value of the "hog motor" for fattening pigs. The hog motor is a machine with a pair of bars so constructed that the pig is compelled to grind the grain before he receives it. In 1911 8 pigs, averaging a little over 200 lbs. each, were divided into 2 lots of 4 each and placed in yards with access to a good rape pasture. In one lot was placed the hog motor filled with shelled corn and in the other lot was placed a self-feeder filled with corn meal. The test lasted 61 days.

The hog-motor lot made an average daily gain of 1.49 lbs. each, requiring 5.63 lbs. grain per pound of gain. The self-feeder lot made an average daily gain of 1.56 lbs. each, requiring 5.72 lbs. grain per pound of gain.

The feeding of pigs, O. B. JONES (*Univ. Col. Wales, Agr. Dept. Bul. 1* [1912], pp. 14, 15).—In an experiment with 6 pigs which lasted about 6 weeks the 3 fed boiled potatoes gained 25 lbs. more than the 3 fed raw potatoes with otherwise similar rations. When the cost of cooking, however, was added the actual gain in money for cooked potatoes was small.

[Swine breeding], SCHROEDER ET AL. (*Illus. Landw. Ztg.*, 32 (1912), No. 75, pp. 635-638, pt. 1, figs. 293).—This number is devoted especially to swine breeding, containing several articles on methods practiced by swine breeders in different parts of Germany, the cost of pork production, and related topics.

On ovariectomy in sows, with observations on the mammary glands and the internal genital organs, R. J. J. MACKENZIE and F. H. A. MARSHALL (*Jour. Agr. Sci.*, 4 (1912), No. 4, pp. 410-420, pls. 2).—Observations upon sows confirm the view that the ovaries are an essential factor in mammary growth, or at any rate in such mammary growth as occurs in nonpregnant animals. The mammary glands apparently undergo cyclical changes corresponding to those which take place in the internal generative organs during the estrous cycle. Changes taking place in the tissues of the mammary region in sows during heat consisted mainly of a congestion of the glands. These changes are of much importance because the part affected in the pig is of much commercial value, there being considerable loss in the quality of the bacon when animals are killed for meat during this period.

In black pigs the case was found to be complicated because of the occurrence of melanic pigment in the mammary region, but as far as the authors were able to determine this pigment is not derived from extravasated blood and has no connection with the occurrence of heat. The pigment is probably similar in kind to the melanic pigment of the hair, and the bacon manufacturer who wishes to differentiate between sows slaughtered at this period and other sows can not rely upon this pigment as a guide. Since ovulation occurs during estrum and not during proestrus it is advisable to hog the sow during the end of the period, and the practice of turning the boar loose to a considerable number of sows is deprecated.

Curing of Italian hams, J. A. SMITH ET AL. (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 249, pp. 385-388).—This describes the various methods of curing hams in different parts of Italy.

Studies on horse breeding, R. MOTLOCH (*Studien über Pferdezucht. Hannover, 1911*, pp. VIII+125, figs. 13; *abs. in Zentbl. Agr. Chem.*, 41 (1912), No. 8, pp. 573, 574).—This discusses inheritance, inbreeding, early maturing, and related problems, based largely on experience in breeding horses in Hungary.

A brief study on the breeding of army horses in Sao Paulo, A. FOMM (*Criador Paulista*, 7 (1912), No. 62, pp. 1289-1306, figs. 17).—A discussion of the type of horses needed for the Brazilian army, and methods of improvement by proper selection of breeding stock.

The Zmudian horse, I. VON MORACZEWSKI (*Mitt. Landw. Inst. Breslau*, 6 (1912), No. 4, pp. 563-600, fig. 1).—A history, characteristics, and measurements are given of the native horse of Zmudz (Samogitia).

The heredity of racing stamina in the thoroughbred horse, J. B. ROBERTSON (*Mendel Jour.*, 1912, No. 3, pp. 37-92).—A discussion of the physiological properties of the muscle and to what extent they are inherited. There is also a Mendelian analysis of data gathered from racing calendars and stud books in regard to types of race horses, the relative staying power of mares and horses,

the essential qualities of a "stayer," and the severity of the race-course test as a selective agent.

The author states that dark red striated muscle is correlated with a capacity for long sustained muscular effort and that an excess of a pale fiber is correlated with inability to respond to repeated stimulation. "The muscles in the heavy breeds of horse appear to be exclusively of a pale red variety. The Shire horse, even when thoroughly conditioned and fit, rapidly suffers from muscle asphyxiation if made to gallop at his top pace, poor as it is, for a short distance. . . . The physiological properties of the muscles of certain race horses are sharply defined from those of others. . . . The gametic composition of these individuals is in accordance with a Mendelian conception of alternative unit characters." "The graduated series of distances over which races are run in Great Britain and Ireland provides a test which, though perhaps not entirely free from error, is, nevertheless, a reliable standard by which an individual horse's racing stamina can be assessed."

Tables are presented to show that mares are at a disadvantage as race horses after 2 years of age.

A note on yellow dun horses and the relation of this color to chestnut, C. J. DAVIES (*Mendel Jour.*, 1912, No. 3, pp. 197, 198).—Some evidence is presented which throws doubt on the recessiveness of chestnut and other colors. It is also pointed out that until some distinction is made between bay and brown it will be impossible to analyze results on the inheritance of color in horses.

The horse's foot, E. T. ROBBINS (*Breeder's Gaz.*, 62 (1912), No. 8, pp. 305, 306, figs. 4).—A discussion of the essential points of the hoofs to be noted in buying horses, based on many years' experience of an expert buyer.

Laying test with different breeds of poultry, C. B. JONES (*Univ. Col. Wales, Agr. Dept. Bul.* 1 [1912], pp. 17-19).—An egg-laying test is reported which lasted from December 1, 1908, to March 18, 1909. The 10 Plymouth Rock hens laid 237 eggs, the 10 Buff Orpingtons 491, and the 9 Partridge Wyandottes 593.

Egg-laying competitions, D. S. THOMPSON (*Dept. Agr. N. S. Wales, Farmers' Bul.* 57, 1912, pp. 14).—A summary of 10 years' work at the Hawkesbury Agricultural College and Experiment Farm, Richmond, New South Wales. The average number of eggs laid per hen was 131 in the first year's contest and 184 in the last year. There was also a noticeable improvement in the type of bird.

Sex-limited inheritance in poultry, C. B. DAVENPORT (*Jour. Expt. Zool.*, 13 (1912), No. 1, pp. 1-18, pls. 8, fig. 1).—A brief review of previous investigations, and a complete report of work previously noted (*B. S. R.*, 23, p. 878) in support of the formula that sex-limited characters have their determiners in the sex chromosomes.

Reciprocal crosses were made with brown Leghorns and dark Brahmas. In the  $F_1$  crosses all males were light, but the females differed according as the brown Leghorns or the dark Brahmas were used as the father. In the  $F_2$  generation there were 2 kinds of males. The observations seem in accord with the hypothesis that the male carries 2 sex chromosomes and the female 1, and that the determiners for certain secondary sex characters are centered in the sex chromosomes, although the development of other characters seems to be especially influenced or modified by the secretions of the sex glands.

Study in ostrich breeding, J. L. FRATEUR (*Bul. Agr. Congo Belge*, 2 (1911), Nos. 3, pp. 371-388; 4, pp. 678-692; 3 (1912), Nos. 2, pp. 366-390; 3, pp. 719-732, figs. 57; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 3, pp. 747-749).—A statistical and general article on ostrich breeding in various countries. Methods of breeding and feeding are described.

## DAIRY FARMING—DAIRYING.

**Production and inspection of milk**, E. V. WILCOX (*Hawaii Sta. [Spec. Pub.], 1912, July 31, pp. XI+348*).—In this publication the author has reviewed the literature on milk and has presented detailed information under the following chapter headings: Normal milk, abnormal milk, hygiene and diseases of cows, feeding cows, buildings and premises, milking and handling milk on the farm, transportation and sale of milk, refrigeration, pasteurization and sterilization of milk, preservatives in market milk, physical and chemical examination of milk, bacteriology of milk, transmission of infectious diseases of milk, milk products in their relation to health, and history of milk inspection. A chapter by Louise Tayler-Jones is given on the dietetics of milk with reference to infant feeding.

A bibliography of milk inspection is included.

**Studies of dairy husbandry, with special reference to the capital invested**, E. CAJANDER (*Abhandl. Agr. Wiss. Gesell. Finland, 1911, No. 2, pp. 76, tables 39*).—This study is based mainly on statistics gathered by the author from 124 dairy farms in Finland. The results are presented in tabular form.

There were more cattle kept per hectare on the small farms than on the large farms. More capital was invested in buildings than in cattle, except in the group of large farms. The largest amount of capital invested per hectare was found on the large farms, but the largest amount of capital per animal was on the small farm.

**Cattle breeding in Vorarlberg**, J. K. GREISENECKER (*Ztschr. Landw. Versuchs. Österr., 15 (1912), No. 8, pp. 901-1001*).—A discussion of the influence of age, weather, conformation, and other factors on milk secretion, based on the milk records and measurements of cows of the Montavon breed, which are presented in tabular form.

**The Illawarra breed of dairy cattle**, F. McCaffrey (*Amer. Breeders Mag., 3 (1912), No. 3, pp. 164-173, figs. 5*).—This contains an account of the origin and characteristics of this type of cattle, which has become a favorite for dairying in the Illawarra district, New South Wales. It has been developed by crossing Shorthorns, Longhorns, Devons, and Ayrshires.

**Cooperative cow-testing associations in Minnesota**, T. SEXAUER, C. S. CATHCART, and H. C. McMURRAY (*Albert Lea [Minn.] State High School Ext. Bul. 1, 1912, pp. 55, figs. 12*).—This contains records of 28 herds, comprising 455 cows.

"The best herd produced an average of 9,485 lbs. of milk and 315 lbs. of butter fat per cow, valued at \$99. The average cost of feed per cow was \$41.69, making a net profit of \$57.31 per cow. The poorest herd produced an average of 1,976 lbs. of milk and 90.7 lbs. of butter fat per cow, valued at \$27.88. The average cost of feed per cow was \$20.43, making a net profit of \$7.45. The silage-fed herds (12 herds, 216 cows) produced an average of 5,706 lbs. of milk, 220 lbs. of butter fat, and made a net profit of \$33.04 per cow. The herds that were not silage fed (16 herds, 239 cows) produced 3,850 lbs. of milk, 161 lbs. of butter fat, and a net profit of \$22.98 per cow."

**Feeding dairy cows**, C. C. HAYDEN (*Ohio Sta. Circ. 128, pp. 183-211, fig. 1*).—This is a popular discussion of the feeding of dairy cows, in which are considered such factors as the composition of feeds, the feeds which can and should be grown on the farm, the feeds which may be purchased and their relative value, the physiological effect of the various feeds on the animal, and practical details of feeding. A table showing the amount of digestible nutrients in a large number of feeding stuffs, modified from Henry's Feeds and Feeding E. S. B., 24, p. 769), is appended.

Cost of delivering a quart of milk to the consumer (*Heard's Dairyman*, 43 (1912), No. 25, p. 859).—As estimated by a firm in Boston the cost of delivering a quart of milk to the consumer was 4.4 cts., to which must be added 0.37 ct. for shrinkage. The average price paid to the producer for 1 year was 3.9 cts. per quart, making a net cost per quart when delivered to the consumer of 8.67 cts.

The effect of sodium chlorid and cold storage upon the activities of proteolytic enzymes, W. N. BERG (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 19 (1912), Sect. VIIIa, pp. 25-27*).—This is an abstract of a paper read before the International Congress of Applied Chemistry, September, 1912.

From the result of studies made with butter, buttermilk, and skim milk it is concluded that at low temperatures and in the presence of sodium chlorid the activity of a proteolytic enzyme may be inhibited if the amount of enzyme is small, whereas if the amount of enzyme is large proteolysis takes place rapidly and is apparently not interfered with by the low temperature or the chlorid. The methods used are described.

Enzym content of milk from diseased udders, H. ULMANN (*Amer. Jour. Vet. Med.*, 7 (1912), No. 8, pp. 329, 330).—Previously noted from another source (*Id. S. R.*, 27, p. 287).

The chemical changes taking place in milk under pathological conditions, L. W. FETZER (*Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 19 (1912), Sect. VIIIa, pp. 111-114*).—This is an abstract of a paper read before the International Congress of Applied Chemistry, September, 1912. The principal changes which were found to take place in the milk of cows suffering from inflammation other than tuberculosis of the mammary glands were the following:

Most milks at the beginning of the process showed a diminution of the apparent acidity. This in some instances went on until alkalinity set in and remained until the disease began to undergo resolution. The acidity then gradually rose to its normal point again.

In acute cases the total solids were high at the outset, but as the process went on there was a diminution. In some instances there was an increase in total solids-not-fat, while in others no marked change took place. Total nitrogen and protein ( $N \times 6.38$ ) increased at the outset and remained high until resolution took place. Casein diminished in some instances and remained so until the pathological condition was eliminated. Lactoglobulin (?) (serum globulin) increased until resolution set in. Albumin (?) (serum albumin) increased during the whole process, then returned to normal.

Lactose diminished gradually as the process went on, then returned back to normal. Fat and cholesterol diminished gradually until the fastigium of the process was reached, then increased again. Lecithin diminished gradually, then increased gradually as resolution was taking place.

Ash in some cases increased, but only in a few instances was a very large increase apparent. The most characteristic changes taking place in the composition of the ash were an increase in the sodium and chlorin content, a corresponding decrease in the potassium content, and in most instances a decrease in the calcium and phosphoric acid content. In all probability a determination of the chlorin content of the milk, or specifically in the ash, will furnish a clue as to whether or not the milk in question is of pathological origin.

Investigations on the presence of tubercle bacilli in milk and milk products, A. EBER (*Ztschr. Fleisch u. Milchhyg.*, 22 (1912), Nos. 8, pp. 243-249; 9, pp. 277-281; *Molk. Ztg. Berlin*, 22 (1912), Nos. 36, pp. 423, 424; 37, pp. 434-436; *Deut. Tierärztl. Wchnschr.*, 20 (1912), No. 30, pp. 457-461).—Milk

milk and butter therefrom were found to contain tubercle bacilli, which were rarely present in unmixed milk. None of the samples of butter made on a small farm contained tubercle bacilli, whereas they were found in 15.6 per cent of the samples of creamery butter. The author advocates pasteurizing all mixed milks, because if the tubercle bacilli are present in only one lot the entire mixture is contaminated.

A study of the bacteriological and sanitary condition of the milk supply of New York City, M. C. SCHROEDER (*Jour. Infect. Diseases*, 11 (1912), No. 1, pp. 1-20, pls. 2, figs. 2).—Of 20,334 samples of country milk 38.14 per cent contained less than 10,000 bacteria, 32.61 per cent contained from 10,000 to 50,000, 11.81 per cent contained from 50,000 to 100,000, 13.39 per cent from 100,000 to 1,000,000, and 4.02 per cent contained over 1,000,000 bacteria per cubic centimeter.

Samples of city milk showed a higher bacterial content, not to be accounted for by the factor of time. It is suggested that it may be due in part to the use of cans and bottles which are not clean and are poorly iced in transit. Milk sold in bottles had a lower bacterial count than that sold in cans.

Some of the conclusions based on this analysis are the following: "The pasteurization of milk by the holding process, though still leaving much to be desired, reduces greatly the number of bacteria, besides destroying any pathogenic varieties. Ice is not sufficiently used to cool the milk. The average temperatures of the milk as delivered to the creameries by the dairymen, with the exception of the winter months, is still too high for milk to be shipped to New York, and has an unfavorable influence upon the milk by aiding the growth of bacteria. Greater care should be observed to obtain clean milk by sterilizing the cans and bottles. The greater part of the milk sold is from 36 to 48 hours old, but a considerable portion is from 72 to 96 hours old, and some even more than 96 hours. This is true of both raw and pasteurized milk."

Creamery inspection, B. H. RAWL (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 18, pp. 784, 785; *Cream. and Milk Plant Mo.*, 1 (1912), No. 1, pp. 16-19; *Cream. Jour.*, 23 (1912), No. 14, pp. 1-4).—This paper was read before the Association of National Dairy and Food Commissioners, 1912. It discusses state and federal inspection, the organization of inspection, standards for cream, and related matters.

Butter control, L. VUAFLEAT (*Ann. Falsif.*, 5 (1912), No. 46, pp. 379-384).—In determining the chemical constants of butter made under different conditions, the author found that the composition of butter made from 1 or 2 milkings, or from mixed farm milk, varied to only a slight extent. That made from morning milk contained slightly more volatile acid than that from evening milk. Keeping cream 8 days did not affect the composition of the cream, neither did bichromate of potash when used as a preservative.

Butter making on the farm, A. B. NYSTROM (*Washington Sta. Popular Bul.*, 41, pp. 4).—Brief popular directions are given.

The German cheese standards (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 10, pp. 492, 493).—A translation of that portion of the report of the Unofficial Association of German Food Chemists which contains the definition of cream, half cream, and skim cheese.

Studies on the factors concerned in the ripening of Cheddar cheese, E. G. HASTINGS, ALICE C. EVANS, and E. B. HART (*Wisconsin Sta. Research Bul.*, 25, pp. 54, figs. 6).—This bulletin presents a summary of the present knowledge of the bacteriology of Cheddar cheese and the results of a detailed study of a number of cheeses. See also a previous note (*E. S. R.*, 23, pp. 383, 679).

Tests were made to illustrate the effect of curdling on the distribution of bacteria. In all samples examined in the laboratory it was noted that a unit

volume of the whey contained less bacteria than the milk before curdling, approximately 77 per cent of the bacteria being retained in the curd. These tests were repeated under cheese-room conditions with similar results.

Whey was found to increase in acidity much more rapidly in contact with the curd than when removed as soon as the curd was cut. In one sample the whey in contact with curd was found to be 0.23 per cent more acid at the end of 10 hours than whey removed when curd was cut. With deep beakers filled with milk, the milk curdled with rennet, the curd cut and allowed to settle, and the beakers so kept as to allow no convection currents it was found that the acidity of bottom layers of whey increased much faster than that of the upper layers, the difference being in some cases 0.4 per cent.

In a cheese made from milk containing but few acid-producing bacteria the ripening was so delayed that at the end of 3 months the cheese showed spongy texture and scarcely any cheese flavor. In an experiment to show the enzymic action of lactic bacteria by the difference in rate of increase in acidity between raw and heated milk preserved with 3 per cent toluol, the daily increase in acidity of the raw milk was found to vary from 0.0012 to 0.0027 per cent and of the heated milk from 0.0005 to 0.0017 per cent. Since results of inoculation of sterile milk have shown that no growth could have taken place after addition of toluol any increase in acidity of the heated milk must have been due to the enzymes set free by the disintegrating cells that act on the milk sugar during the ripening of cheese. Some cultures of *B. lactis acidii* produced inactive acid, some dextro-acid, and some mixtures of the two. One culture from another source produced pure levo-acid.

In studying the percentage of acidity produced by lactic bacilli in milk to which peptone had been added, it was shown that the cessation of their growth in milk when a certain percentage of acidity is reached is not brought about by the antiseptic action of the acid, but by a lack of suitable nitrogenous food.

The development of *B. lactis acidii* was followed by the growth of the *B. bulgaricus* group. They reach numbers comparable with those of the first group, reaching their maximum numbers within the first month of the ripening. Since they developed after the fermentation of the sugar, they must have some other source of carbon and of energy than milk sugar. Coccus, chromogenic, and liquefying types were found and other tests were made which confirmed the work of previous investigators.

A new use for whey (*Molk. Ztg. Berlin*, 22 (1912), No. 35, pp. 409, 410).—A note concerning a new beverage that can be made from whey, and which is called whey lemonade. The method of making is not described.

Tätté, the original preserved curd of the North, and other fermented milks; their significance for the nutrition of man, O. J. OLSEN-SOPP (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 1-6, pp. 1-54, pl. 1; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 6, pp. 1433-1435).—Tätté is prepared from milk while still warm from the cow, by adding some of the old curd which has been dried on straw or linen cloths. The organisms present depend somewhat on the age of the preparation, but *Streptobacillus tätté*, *Lactobacillus tätté*, and *Saccharomyces tätté* were always found, and quite frequently species of *Monilia*, *Torula*, and *Lactococcus*. *Oidium lactis* was common when the preparation was of poor quality.

"Cellar milk" is another form of fermented milk made in Sweden and Norway, and used by the inhabitants of the valleys when the cattle are kept in the mountains during the summer. It is prepared from fresh milk by adding water, boiling, and placing it in the cellar in large wooden vessels previously scalded with a juniper decoction and then rubbed with tätté. The vessels are covered with muslin and the milk after the first week is well mixed every

day. It has the characters of good sour milk, and does not grow moldy or putrefy throughout the summer.

Officials, organizations, and educational institutions connected with the dairy interests, 1912 (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 204*, pp. 26).—This is a revision of Circular 162, previously noted (*E. S. R.*, 23, p. 676).

### VETERINARY MEDICINE.

Handbook of veterinary surgery and obstetrics, edited by J. BAYER and E. FRÖHNER (*Handbuch der Tierärztlichen Chirurgie und Geburtshilfe. Vienna and Leipzig*, vols. 1, 1910, 4. ed., pp. XVI+745, figs. 562; 2, 1911, 4. ed., pp. XVI+340; 3, 1908, pt. 2, pp. VIII+442, figs. 78; 3, 1911, pt. 3, pp. VIII+298, pls. 5, figs. 77; 4, 1908, pt. 1, 2. ed., pp. XI+646, figs. 152; 4, 1908, pt. 2, pp. X+680, pls. 6, figs. 270; 5, 1906, 2. ed., pp. XIII+536, pls. 17, figs. 279; 6, 1908, 2. ed., pp. XV+572, pls. 8, figs. 95; 7, 1910, pt. 1, 3. ed., pp. XV+420, figs. 90).—This work by various authors treats of the subject as follows: Volume 1, operative technique, by J. Bayer; volume 2, general surgery, by E. Fröhner; volume 3, parts 2 and 3, the head, neck, chest, and abdomen, by E. Hess et al.; volume 4, part 4, the extremities, by several authors and part 2, hoof diseases of the horse, by R. Eberlein; volume 5, diseases of the eye, by J. Bayer; volume 6, skin diseases, by H. Schindelka; and volume 7, bovine obstetrics, by M. G. de Bruin.

The diagnosis of pregnancy in animals by the optical and dialysis methods, E. ANDERHALDEN and A. WEIL (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 36, pp. 665-667).—This is a continuation of the studies noted (*E. S. R.*, 27, p. 577). The investigation, which was made with 12 cows, gave positive results in 10 cases. The dialysis method is easier to conduct, but the nature of the cleavage process can not be determined. The method of conducting the tests is given in detail.

The colloids in biology and medicine, H. BECHHOLD (*Die Kolloide in Biologie und Medizin. Dresden*, 1912, pp. XII+444, pls. 2, figs. 52).—The purpose of this book is to point out the colloid phenomena which occur in biology and medicine. It includes an introduction to the methods of colloid investigation, and a discussion of the biocolloids (carbohydrates, lipoids, proteins, foods and condiments, enzymes, and immunity reactions), the organism as a colloidal system (metabolism, the cell, blood, respiration, resorption and secretions; secretions and excretions, etc.), toxicology and pharmacology, and microscopical technique. A bibliography is appended.

The passage of drugs into the sweat, H. TACHAU (*Arch. Expt. Path. u. Pharmacol.*, 66 (1911), No. 5-6, pp. 334-346; *abs. in Jour. Chem. Soc. [London]*, 102 (1912), No. 592, II, pp. 184, 185).—Iodin, bromin, boric acid, phenol, salicylic acid, salol, antipyrin, and methylene blue were found to be excreted in the sweat but the amount was small, as they pass into the milk and other secretions. The amount may be sufficient, however, to cause skin eruptions in certain cases.

The chemical examination of death camas, F. W. HEYL ET AL. (*Wyoming Sta. Bul.* 94, pp. 3-31, figs. 3).—The work here reported relates to *Zygadenus intermedius*, also known as poison camas, lobelia, squirrel food, wild onion, poison sego, poison sego-lily, mystery grass, etc. The alkaloid found in this plant is most abundant in the flowers, which contain approximately 1.25 per cent. The bulb and the leaves and tops contain approximately 0.6 per cent, and the roots but half that amount. Guinea pigs, dogs, and frogs were used in determining the physiological effect of the alkaloid and the antidotes.



The experiments led to the following conclusions: "The alkaloidal preparation from *Z. intermedius* slows the heart rate by acting apparently on the cardio-inhibitory center. It slows respiration by an effect involving the respiratory center. It causes vaso-dilation. In quantities approaching the fatal dose it hastens the heart rate and produces both irregularity of the heart beat and convulsive respiration. The fatal dose given intravenously to dogs stops the heart before respiration ceases. The fatal dose for guinea pigs is between 4.6 and 5.1 mg. per 100 gm. of animal. It has a very powerful action, whether injected or fed, both as a purgative and an emetic."

In order to ascertain the pharmacological properties of the resin present a series of experiments was conducted, the results of which demonstrated it to be physiologically inert.

**The effect of *Tilletia* in the food of domestic animals,** G. PUSCH (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, 11 (1912), No. 1, pp. 1-14).—The investigations here reported have led the author to conclude that domestic animals may consume large quantities of wheat smut spores for a long period without ill effect; and that gestating ruminants and swine may consume large amounts of smutty wheat without aborting.

**A mycotic enzootic caused by blighted barley,** C. DARMAGNAC (*Abd. in Vet. Jour.*, 68 (1912), No. 445, pp. 434, 435).—A brief report of forage poisoning in 21 horses caused by feeding on barley injured by smut (*Ustilago carbo*).

**Destruction of bacteria by leucocytes,** S. SUZUKI (*Arch. Hyg.*, 75 (1912), No. 4-5, pp. 224-234).—A systematic quantitative study of cytolytic activity of leucocytes toward various micro-organisms was made. It was noted that with the fairly sensitive micro-organisms, leucocytes in doses of 0.025 gm. are strongly bactericidal. In the case of the less sensitive micro-organisms, e. g., typhoid, cholera, and fowl cholera, the cytolytic activity ceases with the minimum doses, and even with quantities of 0.5 gm. this activity is very weak, and amounts of from 0.1 to 0.15 are necessary. Leucocytes in 0.025 gm. doses were more effective against the hog erysipelas bacterium than larger doses.

**The development of a leucocytozoon of guinea pigs,** EL H. ROSS (*Ann. Trop. Med. and Par.*, 6 (1912), No. 1, pp. 69-76, pl. 1).—"Kurloff's bodies are parasites, lymphocytozoa inhabiting only the mononuclear cells of the guinea pig's blood. These lymphocytozoa have an intracorporeal stage, and ultimately give rise to free-swimming, spirochete-like bodies, which may be gametes. The development of the spirochete-like body is demonstrated. The name *Lymphocytozoon cobaye* is suggested for this parasite."

**The new mycoses,** DE BEURMANN and GOUGEROT (*Les Nouvelles Mycoses*, Paris, 1912, pp. 165, figs. 16).—This work deals with the exascoses (ex-blastomycoses), oldiomycoses, sporotrichoses, botrytimycosis, oösporeses, and hemisporosia.

**Immunity facts and the outlook,** H. MUCH (*Wärzb. Abhandl. Gesam. Geb. Prakt. Med.*, 9 (1909), No. 6-7, pp. 117-134).—This is a comprehensive digest of the facts relating to immunity. It deals particularly with the present knowledge of the subject as applied to both human and veterinary medicine.

**In regard to opsonins,** A. FRENZEL (*Ueber Opsonine*, Inaug. Diss. Univ. Leipzig, 1911, pp. 87).—The Wright method for determining the opsonic index was found to be satisfactory and the percentage of errors was never greater than 10 per cent. The opsonic index of normal individuals, man and animals was found to vary between 0.9 and 1.1. The indexes of infected individuals which included tubercular humans and bovines, and humans with staphylococcal infections, were found to be in from 40 to 50 per cent of the cases within the normal figure, while all the rest had subnormal or hypernormal indexes. The behavior of blood sera of sound horses and other domesticated animals

toward *Streptococcus equi* was found to be the same as with the tubercle bacillus and the staphylococcus (between 0.9 and 1.1).

In the work it was also shown that very large doses of the staphylococcus vaccine (and likewise opsonogen) are harmless to the animal organism (guinea pigs, rabbits, and dogs). The local treatment which was instituted by Wright and Strubell against staphylococcoses without determining the opsonic index was very satisfactory.

Contribution to our knowledge of antiaggressin sera, F. NEUFELD and KANDRA (Arch. K. Gendhtsamt., 40, (1912), No. 1, pp. 1-23).—After reviewing the aggressin theory and pointing out some of its unexplained features, the authors sought to determine whether a hitherto unrecognized antibody plays a rôle in the activity of anthrax and erysipelas immune sera. For the tests, which were made *in vivo* and *in vitro*, a highly immune erysipelas serum and *Bacillus erysipellatis* were employed.

The results showed that a specific bacteriotropic action was present in most of the cases, and this, according to the authors, explains the reason for the protective and curative properties of the serum. While phagocytosis is present in normal animals the phagocytic manifestations were found to occur somewhat sooner in pathologic animals. The reason for believing that an antiaggressin immunity exists is therefore remote.

The sero-diagnosis of echinococcus disease, W. PFELDER (Ztschr. Infektionskrank. u. Hyg. Haustiere, 11 (1912), Nos. 1, pp. 70-96; 2, pp. 153-169, 3-4, pp. 255-304).—This is a monographic study of the value of the various biological reactions for diagnosing hydatid disease. A bibliography of 152 titles is appended.

Ascoli's reaction (thermoprecipitin) for diagnosing erysipelas, P. SILVA (Chin. Vet. [Milan], Russ. Pol. Sanit. e. Ig., 35 (1912), No. 4, pp. 145-149).—A specific antigen can be prepared from fresh or putrefied organs from animals affected with erysipelas. This antigen when tested with a specific serum will give a characteristic Ascoli reaction. In these tests no reaction was obtained with the serum from healthy hogs or hogs affected with infectious pneumo-enteritis.

A case of swine erysipelas in man, LINSEY (Dermatol. Ztschr., 18 (1911), No. 4, pp. 352-354, fig. 1).—The author reports a case of this disease in a butcher who injured his left hand while slaughtering a diseased hog. The injection of 25 cc. of swine erysipelas serum (Susserin) resulted in a cure in 3 days.

Enteritis, associated with infection of the intestinal wall by cyst-forming protozoa (neosporidia), occurring in certain native animals (wallaby, kangaroo, and wombat), J. A. GILBERT and L. B. BULL (Proc. Roy. Soc. Victoria, n. ser., 24 (1912), No. 2, pp. 432-450, pls. 10).—In this paper what appear to be 4 varieties of pathogenic neosporidia are described as seen in intestinal affections of 3 different genera of native animals, namely, *Sarcocystis macropodis* in the wallaby; *Ileocystis macropodis* and *Lymphocystis macropodis* in the kangaroo; and *Ileocystis wombati* in the wombat.

Theory and technique of the Wassermann reaction for detecting glanders, W. W. FREDERS (Viestník Obshch. Vet., 1901, Nos. 8, 9, 10, 11; abs. in Centrbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 6, pp. 175, 176).—This is a theoretical discussion in regard to the mechanism of the complement fixation reaction (E. S. R., 25, p. 181), and gives practical directions for conducting it. The specificity of the reaction is disturbed if the animal has been previously injected with mallein.

Increased toleration to mallein, K. DEOGASHEVSKY (Arch. Vet. Nauk. [St. Petersburg], 41 (1912), No. 2, pp. 181-187; abs. in Berlin. Tierärztl. Wochenschr., 23 (1912), No. 30, p. 549).—As a result of treating 200 horses with mallein the

conclusions reached are as follows: (1) Repeated injections of mallein to the horses to mallein. A weak reaction or none is obtained when the test is repeated. (2) The results obtained with repeated injections can not serve as a diagnostic aid unless a sufficient length of time elapses between each injection. (3) Malleinization, with the doses usually employed and in periods of 1 month apart, will not show any curative properties for glanders.

Malta fever in Arizona, with a preliminary report of cases, C. E. YOUNT and R. N. LOONEY (*South. Cal. Practitioner*, 27 (1912), No. 6, pp. 257-261).—The authors report 5 cases of Malta fever in man, thus indicating the occurrence of this disease among goats in Arizona.

Spontaneous nephritis in wild rats, W. OPHÜLS and G. W. MCCOY (*Jour. Med. Research*, 26 (1912), No. 2, pp. 249-255, pl. 1).—"Wild rats very frequently (at least in 2 per cent of all cases examined) suffer from a peculiar type of chronic nephritis, one of the characteristic features of which is a very marked tendency to epithelial proliferation and to cyst formation. A condition very similar in all respects to this spontaneous disease may be produced experimentally in white rats by subcutaneous injection of uranium nitrate."

Rabies and its control in New York State, J. G. WILLIS (*N. Y. Dept. Agr. Bul.* 29, 1911, pp. 307-330).—A general account.

On sporotrichosis, L. DE BEURMANN, trans. by R. W. MACKENNA (*Brit. Med. Jour.*, 1912, No. 2693, pp. 289-296).—A general discussion of this disease, the existence and importance of which have been demonstrated.

A contribution to the study of canine piroplasmiasis, N. N. NAVROTSKY and P. V. BÉKENSKY (*Arch. Sci. Biol. [St. Petersb.]*, 17 (1912), No. 1, pp. 31-60, figs. 6; abs. in *Amer. Vet. Rev.*, 41 (1912), No. 6, pp. 639-642).—This paper takes up the clinical appearance of the disease, the condition of the blood and of the urine, the anatomic-pathologic lesions, and the virus.

Trypanosomes obtained by feeding wild *Glossina morsitans* on monkeys in the Luangwa Valley, northern Rhodesia, A. KINGHORN and W. YORKE (*Ann. Trop. Med. and Par.*, 6 (1912), No. 3, pp. 317-324, fig. 1).—The trypanosomes *Trypanosoma rhodesiense*, *T. pecorum*, *T. ignotum*, and probably also *T. vivax* and *T. nanum*, are transmitted in nature by *G. morsitans* in the Luangwa Valley.

[The occurrence of dourine ("Mofo") in Ceará, Brazil], M. SABOIA (*Sobre a Trypanosomíase dos Equídeos, Conhecida no Ceará pelo Nome de "Mofo."* Rio Janeiro, 1912, pp. 64, pls. 8).—The author has succeeded in isolating a trypanosome from sick horses which is apparently *Trypanosoma equiperdum*, the causative agent of dourine. The disease, known in Brazil as "Mofo," has existed as an epizootic for several years in certain districts of that country; the syndrome resembles dourine in every particular.

A note on the morphology of a strain of *Trypanosoma equiperdum*, W. YORKE and B. BLACKLOCK (*Brit. Med. Jour.*, 1912, No. 2696, p. 473, figs. 14).—This note relates to stumpy forms of this parasite which have the macro-nucleus displaced toward the posterior end.

Note on surra, E. W. OLIVER (*Dept. Land Records and Agr. United Procs. Agra and Oudh, Agr. Ser.*, 1912, Bul. 27, pp. 4, pl. 1).—A brief general account with directions for prevention and treatment.

Relation between human and bovine tubercle bacilli, G. S. WOODHEAD (*Lancet [London]*, 1912, I, No. 22, pp. 1451-1457; abs. in *Jour. Amer. Med. Assoc.*, 59 (1912), No. 1, p. 70).—Bovine tubercle bacilli are not considered a negligible quantity as far as tuberculosis in man is concerned. Surgical and abdominal tuberculosis in man will, according to the author's belief, be found to have a direct relation to bovine tuberculosis.

**The relative importance of the bovine and human types of tubercle bacilli in the different forms of tuberculosis.** W. H. PARK and C. KRUMWIEDE (*Jour. Med. Research*, 27 (1912), No. 1, pp. 109-114).—This is a final summary of the cases investigated by these authors (*E. S. R.*, 22, p. 390), and which shows that on the whole bovine infections cause somewhat less than 10 per cent of the total deaths in young children.

**Passage tests with human tuberculous material according to Eber's method.** P. RUTELD, H. DOLD, and E. A. LINDEMANN (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 65 (1912), No. 6-7, pp. 467-481).—As a result of several passage experiments the conclusion is reached that human tubercle bacilli can not be converted into the bovine type by Eber's method (*E. S. R.*, 26, p. 630).

**The use of the Millon reagent for the examination of tuberculous excretions.** B. NICOLA (*Riv. Ig. e Sanit. Pub.*, 22 (1911), No. 10, pp. 296-304; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, 11, Ref., 5 (1912), No. 11, p. 1115; *Chem. Abs.*, 6 (1912), No. 18, p. 2642).—It is concluded that Millon's reagent will give useful results for the examination of tuberculous pus, but can not be used for differentiating tuberculous from nontuberculous pus. It is not serviceable for the first stages of the disease.

**Complement-fixing antibodies and tuberculosis.** B. MOLLERS (*Centbl. Bakt. [etc.]*, 1. Abt., Ref., 54 (1912), Beiheft, pp. 202-212).—The injection of tuberculin in large doses or of killed tubercle bacilli causes the formation of complement-fixing antibodies. The greatest amount of antibodies are produced with the dead bacilli when injected intravenously. The results obtained by the complement-fixing method can not at the present time be entirely relied upon for prognostic or diagnostic purposes.

**A phosphatid as an activator for tuberculin.** H. J. BING and V. ELLERMANN (*K. Danske Vidensk. Selsk. Forhandl.*, 1912, No. 2, pp. 153-167; *Biochem. Ztschr.*, 42 (1912), No. 4, pp. 289-301; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, 11, Ref., 6 (1912), No. 1, p. 399).—A diamino phosphatid albin, was prepared from egg yolks and has the property of stimulating the cutaneous reaction obtained with tuberculin. None of the other lipoids (lecithin, cephalin, cholesterol, oleic acid, sodium oleate, etc.) has the same properties. The activation of tuberculin is possibly of significance as to the action of tuberculin upon the tubercular organism.

**Tuberculosis.** M. A. MÉTIVIER (*Rev. Vét. [Toulouse]*, 37 (1912), No. 10, pp. 615-623).—This is a discussion of the budget granted in France for combating tuberculosis in 1913, together with indemnities for condemned animals suffering from tuberculosis, glanders, and pneumonia. Mention is made of the decrease of contagious diseases and of the methods prescribed for combating them.

**About a case of tuberculosis in a horse.** W. GREYER (*Deut. Tierärztl. Wochenschr.*, 20 (1912), No. 43, pp. 657-659, fig. 1).—A description of the autopsical findings with a horse affected with generalized tuberculosis.

**Tuberculosis in dairy cattle.** E. M. RANCK (*Mississippi Sta. Circ.*, 1912, Aug., pp. 35, figs. 13).—This is a reprint of a report previously noted (*E. S. R.*, 26, p. 378), with brief suggestions as to the inspection of dairies.

**Notes on infectious abortion in cattle.** F. M. SURFACE (*Science*, n. ser., 36 (1912), No. 926, pp. 409-412).—This is a brief résumé of investigations conducted in the United States and Europe in regard to infectious abortion in cattle. The biological reactions for detecting the disease and the factors which are instrumental in disseminating it are discussed.

**Investigation in regard to the biology of the *Bacillus abortus* and infectious abortion in bovines.** H. HOLTH (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, 10 (1911), No. 4, pp. 207-273, fig. 4; *abs. in Hyg. Rundschau*, 22

(1912), No. 11, p. 717).—This is a critical study of the morphology and biology of *Bacillus abortus*, the patho-anatomical changes which are present in aborting bovines, the avenues of infection, and the occurrence of anti-substances in the blood of spontaneously and artificially infected animals, with particular reference to active and passive immunity.

It is shown that the production of agglutinins and amboceptors in artificially infected animals is variable, and that much depends upon the method of introducing the vaccine and whether dead or living organisms are employed. Experimental data are also presented in regard to the behavior of chemical and thermal agencies against the immunizing and anti-substances. In addition some immunizing and protective tests with rats and mice are reported, which show that spotted rats acquire a decided immunity against this organism when treated with killed cultures or culture filtrates of *Bacillus abortus*.\*

Therapeutic tests with curative lymph (Gans) and colpitol (Gans) for contagious vaginal catarrh in bovines, A. GÖHLE (Centbl. Bakt. [etc.], 1. Abt., Orig., 65 (1912), No. 6-7, pp. 515-538).—Gans' curative lymph was found to have only a slight curative power for this disease. Colpitol, on the other hand, affected cures in 30 per cent of the cases, and in all instances where employed improvement was noted in from 16 to 18 days.

Check list of helminths parasitic in cattle, R. T. LEIFER (Jour. London School Trop. Med., 1 (1912), No. 2, pp. 115-123).—A systematic list of the helminth parasites of *Bos taurus*, *Buffelus indicus*, and *Bubus indicus* is followed by an alphabetical list of helminths in cattle and a second list of new genera and species of helminths recorded in 1911.

The introduction of air into the jugular vein, F. CHAMBERS (Vel. Jour., 68 (1912), No. 445, pp. 415, 416).—The author reports experiments made to determine the minimum quantity of air which will kill a bovine when injected into the jugular vein. In the first case, a heifer 3 years old, it took 2,346 cc. of air administered in 12 minutes to cause death; in the second case, that of a 2-year old ox, it took 2,500 cc. of air injected in a period of 4½ minutes to cause death; in the third case, that of 5-year-old cow, 3,000 cc. of air administered quickly caused the death of the animal in 1 minute.

Successful vaccination against pluriform septicemia in sheep, ANDERS (Berltn. Tierärztl. Wchnschr., 28 (1912), No. 48, pp. 701, 702).—In certain districts in Germany quite a number of deaths in lambs occurred as a result of pluriform septicemia. Vaccinations were made with Miessner and Schem's serum in 1908, 1911, and 1912, and these reduced the mortality considerably. Out of 700 4-week-old sheep, which were vaccinated intravenously in 1912, only 10 died.

Antisheep pox vaccination with heated virus, E. DOULOUX (Compt. Rend. Soc. Biol. [Paris], 72 (1912), No. 16, pp. 709, 710; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 6 (1912), No. 1, pp. 380, 381).—Continuing the work previously noted (E. S. R., 27, p. 583) results are now reported which were obtained with 650 sheep. Of these animals 590 were treated with 0.5 cc. of heated virus, followed 7 days later by an injection of virulent virus, and the remaining 60 animals kept as controls.

Of the treated animals 582 showed no reaction toward the injection, 7 showed a slight growth at the site of injection, and 1 had a slight edema. Of the control animals 56 were markedly affected with the pox.

The method of preparing the vaccine has been slightly modified. Congenital bronchial strongylosis in sheep, NEVEU-LEMAIRE (Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 208, pp. 1311, 1312).—The author records observations of the occurrence of adults of *Dictyocaulus flaria* in 2 young lambs in which the infestation must have taken place prior to birth.

**"Mal de Lure."** A pyemia secondary to contagious agalactia of the sheep and goat, H. GANSE. (*Ann. Inst. Pasteur*, 26 (1912), No. 4, pp. 281-299, pl. 1, fig. 2).—The author has found "mal de Lure," which develops secondary to contagious agalactia in sheep and goats, to be due to a new pyogenic bacillus, to which he has given the name "pyobacillus of the sheep and goat." This affection was prevalent during 1911 in the Lure mountain district of southeastern France. The disease is manifested by a purulent sloughing condition of the eyes and udder, suppurative arthritis of the knees, stifles, and hips, and a progressive muscular wasting.

**Hog cholera**, E. L. MOORE and T. B. KELLY (*South Dakota Sta. Bul.* 138, pp. 370-391, figs. 5).—This bulletin consists largely of a general account of hog cholera, including post-mortem appearances, prevention by artificial immunity, the method of producing and testing potent serum, method of vaccination, sanitary measures, etc.

The results of investigations indicate that there is no constant relation between the agglutination reaction of immunizing serum for *Bacillus cholera suis* and its potency as shown by actual field trials. Thus it can not be used as a method of standardizing serums for commercial purposes.

Investigations made to determine the value of the salt solution recovered from the intraperitoneal cavity of hogs killed with acute cholera for hyperimmunization purposes are briefly reported and considered very satisfactory, the virulence of the recovered salt solution having met the standard requirements. The authors state they can see no reason why it can not be used successfully in hyperimmunization work.

**New sero-therapeutic tests for hog cholera**, P. STAZZI (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 38, pp. 697-701).—After giving the geographical distribution of the disease in the districts around Pavia and Milan, Italy, and the preparation of hog-cholera serums, the results of a comparative investigation of the protective value of Hutyr's and L. W. Gans' serums, and the serums prepared at the experiment station for infectious diseases of domesticated animals of the Agricultural Association of Milan, are reported.

In the first series of tests 38 shotes, 3 months old, weighing from 20 to 22 kg., were treated as follows: Ten received the Milan serum, 20 Gans' serum, and 8 animals were injected with Hutyr's serum. All of the animals mentioned above and 6 control animals received injections after the second day of 2 cc. of blood obtained from strongly infected animals. Four of the 6 control animals died within 15 to 20 days, and the other 2 went through the course of a light form of the disease. Of the animals treated with the Milan serum and the Gans serum 1 succumbed in each case, while with Hutyr's serum none of the animals became sick. A second set of experiments conducted under the same conditions gave less favorable results.

In a second series of tests in which an attempt was made to simulate practical conditions animals having natural hog cholera, and others artificially infected, were used. These animals with some controls were housed in the station barns. Far better results were obtained from these tests than from the first series. All of the control animals died of an acute hog cholera, while out of 21 treated animals only 1 died.

It is pointed out that the serum confers marked immunity, which, however, may not be absolute. The curative action of Gans' new serum was found to be very slight or nil.

**Immunizing against swine plague**, ROELCKE (*Arch. Wiss. u. Prakt. Tierheilk.*, 37 (1911), No. 4, pp. 367-381; *abstr. in Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 6, p. 105).—By treating experimental animals with carbolyzed cultures of the swine-plague bacillus an increased resistance toward experimental

infection can be obtained, but not an absolute protection since carbonic acid itself has some effect upon the antigen.

The possibility of utilizing glycerol cultures as a vaccine against swine plague was proved. Precaution, however, must be taken that the glycerol and culture are present in the ratio of 1:1. An excess of glycerol must be avoided.

Investigations in regard to the agglutination of paratyphoid and pestifer strains, TEODORASCU (*Ztschr. Immunitätsf. u. Expt. Ther.*, I, Orig., 14 (1912), No. 6, pp. 639-646; abs. in *Centbl. Bakl.* [etc.], I. Abt., Ref., 54 (1912), Beiheft, pp. 83, 84).—A number of strains of the organisms belonging to the paratyphoid group were isolated from man and pig, and compared as regards their agglutinating properties with paratyphoid, suipestifer, Voldagsen, and Glässer serums. The results agree well with those obtained previously by Haendel and Gildemeister (*E. S. R.*, 26, p. 785).

The effect of wheat eating by horses, W. T. KENDALL (*Aust. Farm and Home*, 21 (1912), No. 8, pp. 346, 348).—The author, having conducted a series of feeding experiments on horses, here gives a brief account of the symptoms, causes of death, and treatment.

A contribution to the study of infectious epididymo-vaginitis of the horse, C. MEDYNSKI (*Bul. Soc. Cent. Méd. Vét.*, 89 (1912), No. 4, pp. 99-106).—The author reports clinical and laboratory studies made of this disease, first recognized and studied in Havre by Vallée, Lesueur, and Lavergne in 1905 and by Guido Finzi in 1910 (*E. S. R.*, 24, p. 485). He finds that the serum from sick or convalescing animals agglutinates Vallée's bacillus in a dilution of 1:200 whereas at the onset of the disease agglutination took place only at a dilution of 1:10. The injection of diseased animals daily for a period of 5 days with 100 cc. of serum obtained from a convalescing animal resulted in rapid improvement.

Certain concretions in a cyst of the mammary gland in a horse, A. SCHEUNEST and W. GRIMMER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1912), No. 4, pp. 322-329; abs. in *Jour. Chem. Soc. [London]*, 102 (1912), No. 592, II, p. 186).—The concretions examined gave the following percentages: Water 69.0, protein 4.5, fat 13.7, cholesterol 10.0, lecithin 0.7, and ash 1.7. The fat somewhat resembled colostrum fat, being intermediate between milk fat and the body fat of the horse. Casein was absent.

\* Check list of helminths parasitic in equines, R. T. LEIPER (*Jour. London School Trop. Med.*, 1 (1912), No. 1, pp. 22-26).—Systematic and alphabetical lists are given. See also a previous note (*E. S. R.*, 27, p. 583).

Report of the bacteriological institute of the agricultural chamber of Rhinisch Prussia (*Jahresber. Landw. Kammer Rheinprov.*, 1911, pp. 70-76).—This is a report in regard to the activities of this institution for the year 1911. It deals with the results of combating tuberculosis in animals; tests in regard to combating various infectious diseases, such as vaginal catarrh; determination of the cause of death in animals; and destruction of mice, rats, etc., with mouse typhoid cultures.

## RURAL ENGINEERING.

Cooperation in water power and irrigation, J. H. LEWIS (*Pacific Builder and Engin.*, 14 (1912), No. 12, pp. 246-248).—This is a paper presented before the Development League Conference, at Lakeview, Oreg., in August, 1912, dealing with the exercise of state credit in developing arid lands and water powers. It is claimed that most of the large commercial enterprises undertaken by

private capital and nearly all the state projects under the Carey Act have failed because of the lack of adequate engineering and complete financial plans, and because of inexperience on the part of the State and interested parties in obtaining good work. It is suggested that since the future prosperity of the State depends in a large measure upon the construction of the large irrigation works, the State should cooperate with the United States Reclamation Service and authorize a bond issue for the construction of irrigation and power projects—the money when invested to be made a lien upon the land irrigated and works constructed to insure its return in from 20 to 40 years with interest, thereby securing development without increasing taxation.

It is concluded that by this method much water power can be developed auxiliary to construction, thus reducing the burden on the irrigator, and that by cooperating with the United States Reclamation Service the state funds can be invested without running the risk of failure because of an inexperienced state department.

**Triennial irrigation revenue report of Sind for the triennium ending 1910-11** (*Trien. Irrig. Rev. Rpt. Sind, 1908-9-1910-11, pp. V+84+2+2, pls. 7*).—This is the fourth triennial revenue report on irrigation works in Sind, containing statistical information, statements showing the working details and results obtained on each project in 4 successive triennial periods, and brief general remarks.

[**Modern irrigation methods**] (*Nat. Land and Irrig. Jour.*, 6 (1912), No. 1, pp. 14-16, figs. 4).—This article deals with past and present irrigation methods, presenting as conclusions that earth ditches are wasteful, costly, and shiftless; that wooden flumes are expensive, temporary, and wasteful; that concrete flumes are perishable, obstructive, and wasteful; and that a concrete pipe underground is a perfect water distributor, cheap in installation, durable, cheap in maintenance, standing very high internal pressures when reinforced, and if skillfully made with suitable materials considerable pressure without reinforcement.

**Application of hydro-electric energy to irrigation pumping in southern Idaho**, E. A. WILCOX (*Elect. World*, 60 (1912), No. 14, pp. 705-710, figs. 13).—This is a description of various installations with data on water requirements and considerations governing rates for service.

It has been found much cheaper and better to water a large tract of land with one large pumping plant than with a number of smaller ones, since the machinery efficiency is greater, the seepage and evaporation losses are reduced, and the cost of installation is lowered. The older data on water requirements called for a depth of 4 ft. or more annually, but recent tests show that a fraction of this is sufficient for most crops and soils. The demand for water runs over 6 months, from April to September inclusive; more than half of the total requirements falling in June and July and the load factor for the 6 months' season being about 0.5.

The energy required for pumping is directly proportional to the lift and to the quantity of water lifted. The cost of energy is based on the consumer's highest half hour peak as shown by a recording meter, the price being commonly 20¢ per horsepower of this peak for the 6 months' season. The generating equipment is used in winter for supplying heat for homes, offices, stores, etc., the heating load being taken on at a flat rate varying with the size and character of the installation.

**Experiments of 1908-1910 on lining of water courses to reduce absorption losses**, F. W. SCHÖNEMANN (*Punjab Irrig. Branch Papers*, 1912, No. 11-c, p. 70, pls. 11).—A large amount of absorption and evaporation data showing the efficiencies of different linings is presented.



Costs of mortar lining on irrigation canals, H. D. NEWELL (*Engin. News*, 68 (1912), No. 15, pp. 651-653, fig. 1).—This article gives cost data on the lining of irrigation canals in the Umatilla project of the United States Reclamation Service, including engineering, equipment, materials, and labor.

Canal M, 12,409 ft. long having a bottom width of 4 ft., depth 4 ft., and side slopes 1½:1, was lined with 1:4 cement mortar 1½ in. thick, with a top curb 4 in. wide and 3 in. thick, at a total cost of \$13,069.91 or 55½ cts per square yard. Canals L, T, and A, with side slopes of 1½:1 and varying from a bottom width of 4 ft. and depth of 3½ ft. to a bottom width of 1 ft. and depth of 1½ ft. were lined where lining was most needed with 1:4 cement mortar, 1½ in. thick, at respective costs of \$1,635.62 or 48.9 cts. per square yard, \$4,638.70 or 62½ cts. per square yard, and \$2,028.76 or 64.2 cts. per square yard. A series of gagings indicates that the lining placed has practically eliminated seepage losses.

Reclaiming Minnesota swamp lands, G. A. RALPH (*Farm Implements*, 26 (1912), No. 8, pp. 36, 40).—A summary of 6 years' drainage work in Minnesota, showing the reclamation of 6,250,000 acres of swamp land at a total cost of \$10,008,648 and an estimated benefit of \$18,778,915.

Filling a swamp with a pump, C. H. CLARK (*Amer. Cult.*, 74 (1912), No. 37, p. 2, figs. 4).—A new method of swamp land reclamation, in which a dike was constructed inclosing the flat swampy end of a lake and electrically driven centrifugal pumps were used to pump out the surplus water and to wash the soil from the surrounding hills for filling in the swamp, is described.

The char-pit method of destroying stumps, H. W. SPARKS (*Washington Sta. Popular Bul.* 40, pp. 8, figs. 5).—A summary of data previously noted (E. S. R., 26, p. 787).

New state road law in Arizona (*Good Roads*, n. ser., 4 (1912), No. 14, pp. 144-146).—A new set of road laws regulating road administration, financing, construction, and maintenance in Arizona.

Benefits of improved roads (*U. S. Dept. Agr., Farmers' Bul.* 505, pp. 20, figs. 8).—This publication deals with the economic and social benefits of improved roads, quoting considerable statistical road data and cites examples to show that roads improved by surfacing and reducing the grade and length decrease the cost of hauling, increase the value of farm lands, increase the tourist travel, and improve school and social conditions, and the rural delivery mail service. It discusses the relation of roads to agricultural conditions and states that good roads mean the encouragement of diversified farming, an increase in the area of profitable production, more favorable marketing, and the securing of more uniform distribution of farm products.

In the discussion of hauling cost it is pointed out that the maximum grade of a road tends to limit the load that can pass over the entire road and that steep grades are more detrimental on improved than on unimproved roads, since the grade effect quickly exceeds that of the reduced tractive resistance. Attention is called to the almost total lack of reliable traffic data, and the advisability is suggested of making a traffic census, including total hauling charges, in each locality in order to obtain a ton-mile cost for the various commodities hauled, and therewith compute the amounts of money which may be profitably borrowed for road improvement.

Concrete highways in New York State (*Concrete-Cement Age*, 1 (1912), No. 3, pp. 51-51, figs. 5).—This article includes the principal construction specifications and tabulated data showing the details of concrete road construction, and makes particular reference to a jointless concrete road on Grand Island.

[Specifications for experimental jointless roads] (*Concrete-Cement Age*, 1 (1912), No. 3, pp. 52-54).—Specifications as issued by the Office of Public

**Plans of this Department** for cement concrete with bituminous surface, oil cement concrete, cement, gravel, crushed limestone, and crushed trap rock for road construction are presented.

**A highway bridge in detail** (*Cement Era*, 10 (1912), No. 10, pp. 30, 31, figs. 2).—Working plans and specifications are given of a novel combination of steel and reinforced concrete in a double span highway structure with reinforced concrete abutments and piers, and reinforced concrete floor supported on steel I-beam girders. The estimate shows 36,491 lbs. of steel and reinforcing and 267½ cubic yards of concrete for the 56 ft. structure.

**Influence of moisture on the expansion and contraction of concrete** (*Engin. Rec.*, 66 (1912), No. 14, pp. 375, 376).—This is an abstract of a paper read by L. W. Page before the Ohio Engineering Society in which he gives the results and conclusions of investigations of the cracking of concrete, especially in road construction soon after completion, due to the inherent contractive qualities of the concrete mass in hardening.

The results show that the contraction and expansion vary with the strength of the mixture, which is a cause for shearing action and separation of the rich top coat from the leaner base mixture in concrete pavements. They further show that if during a period of 6 months the temperature of a concrete mass falls 100° F., each inch of length will contract 0.00055 in.; that if the mass dries, each inch will contract 0.00068 in.; and that there is a further contraction due to the subsequent loss of heat brought about by the chemical action of the cement. In a 100 ft. concrete roadway the contraction might be as much as 1½ in., which brings about an enormous tensile stress causing cracking and breaking up of the pavement.

[A selection of farm power], **STRECKER** (*Maschinen Ztg.*, 10 (1912), No. 16, pp. 185-192, figs. 4).—This is a discussion of the farm power question, making comparisons of the costs of power by electricity, internal combustion engines, and steam. Tables showing cost data are given for all three, with a table of comparative cost data, showing that economy in farm power depends on the use to which it is put, the amount required, the length of time it is to be used, and the local prices per unit of power. When from 8 to 20 horsepower are required for an average of 200 working hours or less per year, electricity is considered the cheapest, but when from 8 to 20 horsepower are required for from 600 to 1,500 working hours or more per year the data indicate that internal combustion power is the cheapest with steam and electricity alternating for second place in cheapness.

**Electricity on the farm**, P. A. BATES (*New York*, 1912, pp. 1661-1679, pls. 12, figs. 3).—This is a paper presented at the twenty-ninth convention of the American Institute of Electrical Engineers in which the author discusses the application of electricity to irrigation and drainage pumping and to farm lighting and machinery driving, describing several installations and pointing out their economic advantages. He discusses public service electric lines and farm cooperative systems, and states that where neither of these is feasible a small private system of lighting may be installed for approximately \$250, and that more power as needed may be generated at reasonable cost. He encourages the use of electricity for lighting, heating, and power because of the great safety from fire.

**Electricity in agriculture**, A. VIETZE (*Arb. Landw. Kammer Prov. Sachsen*, 1911, No. 22, pp. 42, figs. 18).—This pamphlet discusses the farm electric power and light movement with special reference to installation and relative economy of cooperative and central electric farm plants and public service systems, makes comparisons with other sources of power and light, and outlines the

technical and practical details of the use of electricity for farm lighting and for driving the different kinds of farm machinery.

Competitive tests of drills, G. FISCHER (*Arb. Deut. Landw. Gesell.*, 1912, No. 222, pp. 25, pl. 1, figs. 10).—The methods and results of tests of 11 drills having working breadths of from 2 to 4 meters, wheel diameters ranging from 1 to 1½ meters, weights ranging from 400 to 1,200 kg., and prices ranging between 400 and 1,500 marks are described. The drills were tested with oats, peas, beans, wheat, rape seed, corn, and various mixtures of these in single and multiple row work under varying ground conditions, especially noting the influence of ground slope on the working of the machines and the distribution of the grain in the rows.

The results show that with one or two exceptions the drills did fairly good work in distributing the seed, and that the percentage of injured seed was small, although there is still room for improvement. The change in ground surface affected the machines materially, some of them giving very unsatisfactory results on hilly or sloping ground. The principal objections were to the general construction and prices of the machines.

Test of a mowing machine, J. REZEK (*Mitt. Landw. Lehrkanz. K. K. Hochsch. Bodenkul. Wien*, 1 (1912), No. 2, pp. 245-250, pl. 1, figs. 3).—This is an ordinary mowing machine, set on 2 wheels, in which the axle transmits the motion by a ratchet to a set of 4 properly geared cogwheels, one of which is connected to a shaft. The shaft transmits the motion to a wheel and a wooden connecting rod which works the knives back and forth in the sickle. The cogs are thrown in and out of gear by means of a foot lever and the sickle elevation is regulated by a hand lever.

The machine was tested in heavy clover and in green corn in both wet and dry weather and under varying conditions of temperature and ground surface and was found to be a light running, good working, and durable mowing machine. A plan and elevation drawing of the machine accompany this report.

An investigation of the air lift pump, G. J. DAVIS and C. R. WEIDNER (*Bul. Univ. Wis.*, 1911, No. 450, pp. 167, figs. 40).—This bulletin deals with the air lift pump in general, discussing the principles and theory of its operation, as set forth by leading authorities, together with a general description of several types of air lift pumping plants, consisting essentially of an induction pipe, air compressor, air receiver, air line, foot piece, and tail piece. The disadvantages of the air lift pump are set forth as low efficiency, averaging from 25 to 33 per cent; great depth of submergence necessary for ordinary lifts; limited horizontal pumping capacity; and aeration, causing rusting of parts. The advantages are set forth as large capacity; low maintenance and operating costs; indifference to high temperatures; aeration, causing oxidation of impurities; and reliability. A large amount of data are given resulting from a number of experiments conducted on several different types of this pump showing that the variables which may affect a particular type and size of pump are the percentage of submergence, lift, discharge, volume, and pressure of air.

Farm buildings for landowners, agents, and tenants, C. E. CURTIS (*London*, 1912, pp. VIII+144, pl. 1, figs. 22).—This work deals with the arrangement, design, and construction of farm buildings in a manner simple enough to be intelligible and useful to landowners and their agents and tenants. It contains chapters on farm buildings, farm homesteads, buildings and their arrangement, plans, sections, and elevations, cow stables and covered yards, preservation of rain water, and buildings for small holdings.

A colony poultry house (*Ann. Rpt. Agr. Soc. Ontario*, 12 (1912), pp. 76-78, figs. 3).—A description is given of a portable colony poultry house 12 ft. long and 8 ft. deep set on 4 by 8 in. runners with a frame of 2 by 4 in. scantling.

and with walls, floor, and roof of matched pine flooring. The roof is covered with prepared roofing and the interior fixtures, such as doors, windows, roosts, nests, etc., are arranged to facilitate lighting, ventilating, and cleaning.

**A concrete root cellar.** D. FOLSOM (*Country Gent.*, 77 (1912), No. 39, p. 18, figs. 2).—An outline is given as to the construction of a concrete root cellar, stating that it is essential that the site be well drained and dry under normal conditions to prevent dampness and decay inside. A 1:2:4 mixture is used for the footings, walls, and roof, and a 1:2½:5 mixture for the floor. The roof is reinforced with heavy woven wire fencing, and 2 drain tiles covered with galvanized iron hoods are used as ventilators. A side section of the building is given showing details.

[Hot water in a greenhouse], H. L. ALT (*Dom. Engin.*, 60 (1912), No. 12, pp. 292-297, figs. 25).—The details of a hot water heating system satisfying greenhouse requirements, and consisting of 2-in. wrought iron pipe coils in sufficient quantity to maintain an average temperature of 60° F. in a total heating space covering some 6,000 sq. ft., are presented.

### RURAL ECONOMICS.

**Work accidents and the farm hand.** D. D. LESCOPIER (*Survey*, 27 (1911), No. 1, pp. 946-951, figs. 4).—This article discusses and illustrates the economic significance of farm accidents. It shows that much of the machinery used on the farm is more dangerous than that used in most factories, since the public has not known enough about the number, causes, and consequence of accidents on farms to realize that farm workers need legal protection against unguarded machinery as badly as do factory workers.

A table itemizing the 135 agricultural accidents in Minnesota for a period of 20 months is given. Of these accidents 16 were fatal, and 9 involved the loss of an arm, 10 of a hand, 42 of one or more fingers, and 1 each of a foot, a leg, or both eyes. There were also 16 breaks and fractures, 16 serious and 7 severe crushings, and 13 serious and 9 severe lacerations.

**Possibilities of American farms.**—A comparison with Germany, E. MERRITT (*Tribune Farmer* [N. Y.], 11 (1912), No. 570, p. 2).—The author considers it inexpedient to attempt to reach Germany's standard of production in this country at present, and discusses the differences in conditions. "As soon as the increase in population creates a demand, our farmers will increase their production to meet it."

**The high cost of farming.** B. F. YOAKUM (*World's Work*, 24 (1912), No. 5, pp. 519-533, figs. 18).—This is the first of a series of articles discussing the causes of an alleged decrease in the purchasing power of the dollar in America from 100 cts. to 70 cts. during the last 15 years as compared with a decrease in England from 100 cts. to 78 cts., and a still smaller contraction in Germany. The causes assigned are the excessive burden of interest charges on farm loans because of inadequate money-lending facilities, the excessive cost of selling and delivering farm products to the consumer, the excessive cost of cartage from the farm to the railroad because of poor roads, and the need for more and better railroads.

The author discusses each item in detail, showing the cost of these deficiencies, the steps taken in other countries to eliminate them, and the steps needed in America to that end. As an illustration of one difficulty under which the American farmer does business, it is stated that whereas the United States Government can borrow money for \$20 per annum per \$1,000, and New York call loans command \$24.60, commercial paper in the United States \$41.10, French farms \$43, German farms \$44, the best public utilities or New York

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mortgages \$50, average American industries \$65, and Arab farms in Egypt \$80, the rate paid on the average American farm is \$85.

**Cheap money for farmers.** J. W. WARD (*Grain Growers' Guide*, 1 (1912), Nos. 38, pp. 7, 21, 22, 30; 39, pp. 8, 13, 14).—This is a series of articles discussing and outlining a system of government loans for the farmers of western Canada based on the experience of Australia, New Zealand, and Germany. It is proposed that the provincial governments, upon the credit of the Provinces, borrow on the market at 4 per cent, allow 1 per cent for the cost of administration, and loan the money to farmers at 5 per cent, the initial expenses in the way of inspecting the property which is to be security for the loan, the drawing of mortgages, etc., to be borne by the borrower. It is suggested that the loans be limited to about 50 per cent of the value of the property on which they are to be secured, except that, in the case of homesteaders who have not earned their titles, provisions might be made to advance them a certain proportion of the value of the improvements which they have made.

**Agricultural cooperation in Switzerland** (*Tribune Farmer* [N. Y.], 11 (1912), No. 570, p. 5).—This is stated to be one of a series of reports from American diplomats abroad regarding farmers' cooperative systems of various countries.

It is shown that one of the principal purposes of the Swiss Farmers' Association, which is represented in the Swiss National Council, is to regulate to a large extent the prices of milk and other agricultural products in the interest of the farmer. Similar associations with the same principles and purposes have also been established in the various cantons (States) and are members of the Swiss Farmers' Association. Besides these there are a number of local cooperative societies which have for their purpose the purchasing of seed, fertilizers, etc.

The federal government contributes annually 25,000 francs to the expenses of the central bureau maintained by the Swiss Farmers' Association. In the various cantons provisions are also made to facilitate loans to farmers through government mortgage banks, the chief advantage of which is that the farmer does not have to repay the loan in a single payment and he is practically relieved from the danger of foreclosure of his mortgage. Financial aid may also be rendered by municipal, cantonal, and federal authorities to undertakings which have for their purpose the improvement of the soil in the way of irrigation, drainage, road making, fencing, etc.

**Institutions for agricultural credit** (*An. Statist. României*, 1912, pp. 176-245).—Statistical tables are here presented giving detailed accounts of the condition and growth of agricultural credit societies; the status and extent of the loans; and the establishment, work, and progress of rural banks; together with other data relating to the many phases of agricultural credit in Roumania.

**Cooperative agricultural distribution and production** (*Ed. Trade [Gt. Brit.], Abs. Labor Statist. United Kingdom*, 15 (1912), pp. 248-253).—Tables are given presenting a general summary as to the number and total sales of cooperative societies in the United Kingdom engaged in agricultural distribution and production in each of the years 1896-1910, distinguishing the classes of societies. Other tables show capital, amount of land, sales, etc., of the cooperative small holdings and allotments societies in each of the years 1908-1910, together with the number of cooperative credit associations, members, capital, amount of loans granted, and other particulars for the years 1901-1910.

**Small holdings.** E. J. CHENEY (*Ed. Agr. and Fisheries [London], Ann. Rep. Proc. Small Hold. and Allot. Act [etc.]*, 1911, pp. 99).—The data here reported have been previously noted (*E. S. R.*, 27, p. 592).

**A handbook of Virginia.** G. W. KOINER (*Richmond, Va.: Dept. Agr. and Immigr., 1911, 4. ed., pp. 272, pl. 1, figs. 87*).—This publication shows the agricultural resources, as well as the agricultural and industrial development, of Virginia during the last decade. It is noted that the value of farm crops produced in the State increased from \$129,000,000 in 1900 on 4,000,000 acres to \$236,000,000 in 1910 on 3,300,000 acres.

**[Agricultural products and resources of Mexico]** (*In Mexico: A General Sketch. Washington, D. C.: Pan American Union, 1911, pp. 80-158, pl. 1, figs. 29*).—This publication presents along with other data a compilation as to the extent and character of the agricultural products and resources, timber and timber products, stock raising, mining, other industries, etc., of Mexico.

**Agricultural progress in Trinidad and Tobago.** CARMODY (*Dept. Agr. Trinidad Bul., 11 (1912), No. 70, pp. 15-23*).—An address delivered at the West Indian Agricultural Conference held at Trinidad January 23-30, 1912, in which the author points out the many directions in which progress has been made in the colony. Statistics are given comparing the principal agricultural exports for the years 1895-1900, 1903-4, and 1910. The principal crops, named in the order of their importance, are cacao, sugar, coconut, rice, and coffee. The value of exported cacao amounted in 1910 to £1,230,097.

**Agricultural statistics, 1911.** R. H. REW (*Bd. Agr. and Fisheries [London], Agr. Statis., 46 (1911), No. 1, pp. 97, fig. 1; abs. in Jour. Roy. Agr. Soc. England, 72 (1911), pp. 409-418*).—A report presenting notes and statistics as to the acreage and live stock returns of Great Britain, with summaries for the United Kingdom.

The total land area of Great Britain is reported for 1911 as 56,214,419 acres, of which 32,004,658 acres are returned as cultivated area, a decrease of 51,272 acres as compared with 1910. During the last 10 years the reduction of the cultivated area has amounted to 323,000 acres.

The agricultural holdings containing from 1 to 5 acres numbered 108,552 in 1910, and 110,596 in 1911; those containing from 5 to 50 acres numbered 232,585 in 1910, and 234,040 in 1911; the farms having from 50 to 300 acres numbered 151,102 and 151,197 in 1910 and in 1911, respectively; and the number containing over 300 acres is reported at 17,426 in 1911, as compared with 17,569 in 1910. Of the total number of holdings 60,217, or 1.73 per cent, are operated by the holders, and 43,289 of these are holdings from 1 to 50 acres.

Tables are given, showing the acreage under crops and grass and the number of live stock in each division of Great Britain in 1911 and 1910; number of holdings farmed; acreage under orchards; and the different kinds of small fruits, other crops, etc., for each county in 1911.

**Agricultural statistics** (*Statis. Jahrb. Schweiz, 20 (1911), pp. 40-57*).—An official report giving agricultural statistics of Switzerland by cantons, showing the area in cultivation, the average and total yields, value, etc., of the leading crops, the production, value, etc., of dairy products, and other agricultural data for varying periods.

**Foreign crops, July, 1912.** C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 39, pp. 15*).—This circular presents notes and statistics as gathered from reports of various foreign countries regarding crop conditions, area, production and estimated yields of foreign crops, 1911-12, with comparisons; together with statistics as to imports of wheat and wheat flour into Belgium, 1906-1911; and imports of cotton into European and Asiatic Russia, 1906-1910.

**Crop Reporter** (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 8, pp. 57-64, fig. 1*).—Notes and other data showing crop conditions August 1, 1912, with comparisons are here presented; also receipts at and exports of durum wheat from the principal United States ports 1908-1912; farm value of



important products by States and on various dates; farm marketing and prices of wheat by months; value of the foreign trade of the United States, 1909-1912; hay, temperature, and precipitation statistics; average world production of important agricultural products; production of sugar and sugar cane in the Territory of Hawaii, 1910-11; and range of prices of agricultural products at important markets.

**Crop Reporter** (*U. S. Dept. Agr., Bur. Statist. Crop Reporter*, 14 (1912), No. 9, pp. 65-72, fig. 1).—A report showing crop conditions September 1, 1912, with comparisons, is given; likewise data as to the monthly receipts and stocks of eggs and poultry in the United States; farm value of important products on dates indicated; average condition of all crops, by States; average condition of specified crops, United States; temperature and precipitation statistics; farm value of important crops; imports of farm and forest products; monthly movements of grain from farms; and the range of prices of agricultural products at important markets.

The total cotton ginned in the various States up to September 1 was 729,326 bales for 1912, as compared with 771,297 for 1911, 353,011 for 1910, and 388,242 for 1909.

### AGRICULTURAL EDUCATION.

**The university ideal**, A. M. SOULE (*Athens, Ga., 1912, pp. 20*).—This is a discussion of the origin, rise, and influence of the American university system, considering such functions of a university as the maintenance of a graduate school, leadership in public affairs, and extension work.

**Educational culture for the people of Manitoba**, J. W. ROBERTSON (*Winnipeg: Univ. of Manitoba*, 1912, pp. 8).—This address, given at the convocation of the University of Manitoba, makes a strong plea for such further reorganization and reconstruction of "courses" and "time tables" in schools, colleges, and universities as will insure a full measure of an educational culture as suitable for the fundamental vocations or occupations as the formal education of the recent past has been for the learned professions.

**Report of agricultural extension department**, E. S. RICHARDSON (*Univ. Bul. La. State Univ., n. ser., 3* (1912), No. 6, pt. 1, pp. 16).—A report of the work accomplished by the department since its organization in 1909.

**Something of the district agricultural schools** (*Farmers' Union Sun*, 14 (1912), No. 26, pp. 3, 4).—A popular description of the work at the Statesboro Agricultural School of Georgia, which last season had an enrollment of 23 pupils, 50 of whom were girls. The boys do all the farm work, each student being required to put in 9 hours a week on the farm and 4 in the shop, and being paid by the hour for all additional time. The same principle is applied in the girls' department.

**Report of agriculture in the high schools of Michigan**, W. H. FRENCH (*Mich. Agr. Col., Dept. Agr. Ed. Bul. 8*, 1912, pp. 23, figs. 15).—This report gives the plans and purposes of the work and what has been accomplished up to the present time. A statistical table shows the enrollment in agricultural classes, expenses for instruction, and the character of the extension work.

**High schools that train for farming**, C. W. WARBURTON (*Country Gent.*, 77 (1912), No. 31, pp. 7, 24, fig. 1).—This is an account of how Minnesota schools are adapted to the needs of country pupils.

**Country schools for city boys**, W. S. MYERS (*U. S. Bur. Ed. Bul.*, 1912, No. 9, pp. 22, pls. 5).—A few of the results thus far obtained from the establishment of a country school for city boys at Baltimore, Md., and other places are given. The movement has been supported entirely by private means.

**Preparation of teachers for rural work**, A. C. MONAHAN (*Winthrop Norm. and Indus. Col. S. C. Bul.*, 5 (1911), No. 1, pp. 32-40).—The author maintains that, in the future, economy and efficiency will force the number of one-room district schools to decrease constantly and the number of consolidated or centralized schools, to which the pupils are transported at public expense, to increase greatly; that agriculture, home economics, prevention of diseases, sanitation, and good citizenship should be included in the curriculum; and that the teacher become a permanent part of the community. Although the teacher need not be an expert farmer, housekeeper, doctor, or nurse, she should be well enough informed in these subjects to teach their elements and to aid in the direction and arrangement of more complete instruction for adults.

**The rural school**, F. S. COOLEY (*Bul. Mont. State Col. Agr.*, 9 (1911), No. 2, pp. 29).—This bulletin contains, among other things, suggestions for rural teachers and others who are interested in developing plans to assist the schools in the discharge of their full function as an agency for country betterment.

**The organization of correspondence courses in agriculture**, J. HAMILTON (*Proc. Assoc. Amer. Agr. Cols. and Expt. Stas.*, 25 (1911), pp. 186-193).—The author outlines a plan of extension teaching by the correspondence method, in which he suggests the formation of classes of not more than 15 persons to meet daily from 8 a. m. to 4.30 p. m. for a limited period, under the direction of a leader. The leader would in most cases be a layman residing in the neighborhood, and should be appointed by the extension department of the agricultural college. His main business would be to see that the students did the required work, to conduct quizzes, assist students in reference work, oversee the practicum, have charge of apparatus and materials for laboratory work, keep records, and make reports. The course of study should be printed in detail and should be upon a single topic for each class organized. Suggestions are given for the various details of conducting classes in this way, for summer schools for training class leaders, and for the organization of the necessary office force.

**Opportunities in the government service**, D. S. BUCH (*Wis. Country Mag.*, 6 (1912), No. 4, pp. 11-14).—In this discussion, the term "government service" refers to work in the U. S. Department of Agriculture.

**State aid to agriculture in Ireland**, H. PLUNKETT (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 37-61).—This is a detailed account of the administration of state aid for agricultural instruction in Ireland, dealing chiefly with the policy and work of the Department of Agriculture and Technical Instruction for Ireland.

**Statistics of education in the Kingdom of Württemberg for 1911** (*Statist. Unterr. u. Erziehungsw. Kgr. Württemb.*, 1911, pp. 64).—Information is given for 1911 similar to that for 1910 previously noted (*E. S. R.*, 27, p. 695).

**School agriculture**, M. N. WOOD (*New York and London, 1912*, pp. XV+339, pls. 14, figs. 180).—This book is intended for classes in rural and graded schools, and includes most of the principles of general agriculture. Experiments and a suggestive list of reference books follow each chapter. Considerable attention is given to illustrations developing the different topics.

**A tentative course of study in the subject of agriculture for the elementary schools of the State of Ohio for the year 1911-12**, F. W. MILLER ET AL. (Columbus, Ohio: [Dept. Ed.] 1911, pp. 11).

**Lessons from forest and orchard**, A. W. NOLAN (*Agr. Col. Ext. Univ. Ill. [Circ.]*, 1912, July, pp. 35, figs. 16).—Six lessons in forestry and 7 in orchard management are presented, also practical exercises to be correlated with the school work in nature-study and elementary agriculture.

**The renewal of the neglected orchard**, C. S. WILSON (*Cornell Reading-Courses, Fruit Growing Ser.*, 1912, No. 1, pp. 173-180, figs. 5).—Directions of

general application are presented. A supplement contains 11 suggestive questions for the teacher in orchard management.

**Elementary entomology**, E. D. SANDERSON and C. F. JACKSON (*New York, Chicago and London, 1912*, pp. V+372, figs. 496).—This work has been prepared as a text-book for beginners in entomology. Parts 1. (pp. 5-66) and 2. (pp. 67-274), by the senior author, deal with the structure and growth of insects and with the classes of insects. Part 3 (pp. 275-358), by the junior author, is devoted to laboratory exercises.

**Notes in agricultural arithmetic**, C. A. WHEELER (*Storrs, Conn., 1912*, pp. 77, figs. 104).—In the development of this subject, the author has made use of grades to give practice in percentage; of scales and free-hand lettering forms to encourage neatness in the students' work; and of isometric projection. The contents include chapters on foods, fertilizers, and painting.

**Cement silo construction**, G. S. HINE and G. C. WHEELER (*Agr. Ed. [Kans. Agr. Col.], 4 (1912), No. 6, pp. 79, figs. 29*).—This publication gives data on building solid-wall and metal-lath silos.

**Civic improvement in village and country**, F. A. WAUGH (*Facts for Farmers [Mass. Agr. Col.], 2 (1912), No. 12, pp. 4*).—A suggestive outline of work for those interested in community betterment.

**Public schools and community life**, E. L. HOLTON (*Vocational Ed., 1 (1912), No. 5, pp. 351-354*).—The author points out the necessity for the redirection of schools toward the home, farm, shop, and higher levels of community life, not theoretically but practically, and cites what is being done in Kansas through improvement clubs in several hundred rural neighborhoods, the teaching of agriculture in more than 7,000 rural schools and about 450 city and village schools, and of home economics in about 700 rural schools and 200 village and city schools, one-day agricultural fairs in rural and village schools, and short winter courses for farmers and farmers' wives in several county high schools and one or two city schools. The program of a rural school improvement meeting is given, as is also an outline of a 2-year course followed in a high school in Wisconsin.

**The text-book of agricultural education and rural life: Boys' and girls' agricultural clubs**, T. W. HORTON (*Columbus: Ohio Assoc. Adv. Agr. Ed. [1912], pp. 20, figs. 6*).—The author states that boys' and girls' agricultural and domestic science clubs offer a most useful means of solving the problem of giving boys and girls an opportunity to put into actual practice in the soil or in the house the lessons learned in the school, and also giving useful vacation work to connect the school and home life. An account is given of a club organized in March, 1911, in Scioto Township, Pike County, Ohio.

**The school-home garden**, E. C. BISHOP (*Nature-Study Rev., 8 (1912), No. 5, pp. 169-172*).—According to the author, in schools where vacation work is not practicable, the mission of the school garden should be (1) as an experimental plot for the study of germination of seeds and root and stem development so far as is possible when school is in session; (2) for the growing of vines and shrubs, which may help to cover or shield the view of outbuildings and form a part of the school-ground landscape work; (3) for the growing of such other plants as may be given a start in the spring, and by mulching or other pre-arranged care during the summer, blossom or bear results at the fall opening of school; and (4) as an experimental\* or demonstration garden on a small scale, to create an interest that will impel pupils to plant gardens of their own at home.

**West Virginia Arbor and Bird Day manual** (*Charleston, W. Va.: Dept. of Schools, 1912, pp. 78, pls. 16, figs. 15*).—This contains suggestions and material for the observance of the day.

**Arbor Day in Porto Rico** (*San Juan, P. R.: Dept. Ed., 1911, pp. 47*).—This pamphlet, published in English and in Spanish, contains a program and other material for the celebration in the public schools of Porto Rico of Arbor Day, which occurs on the Friday following the last Thursday in November.

**Farmers' Institutes in Pennsylvania**, compiled by A. L. MARTIN (*Penn. Dept. Agr. Bul. #14, 1911, pp. 82*).—This bulletin contains information for institute managers and program committees on institute work in Pennsylvania, and other data.

MISCELLANEOUS.

**Twenty-second Annual Report of Mississippi Station, 1909** (*Mississippi Sta. Rpt. 1909, pp. 14*).—This contains the organization list, a financial statement for the federal and sales funds for the fiscal year ended June 30, 1909, and for the substations for the period from May 16, 1908, to April 23, 1909, and a report by the director on the work of the station during the year.

**Twenty-third Annual Report of Mississippi Station, 1910** (*Mississippi Sta. Rpt. 1910, pp. 12*).—Data corresponding to the above are given for the period ended June 30, 1910.

**Annual Report of Porto Rico Station, 1911** (*Porto Rico Sta. Rpt. 1911, pp. 44, pls. 4*).—This contains the organization list, a summary by the Special Agent in Charge of the investigations conducted at the station during the year, and separate reports by the chemist, horticulturist, assistant horticulturist, entomologist, pathologist, and animal husbandman. The experimental work reported is for the most part abstracted elsewhere in this issue.

**Partial bibliography and index of the publications of the college of agriculture and the agricultural experiment station** (*Missouri Sta. Bul. 105, pp. 19*).—This comprises a bibliographical list and index to Farm Bulletins 1 to 35 of the college of agriculture, and the following publications of the station: Bulletins 1 to 82, Circulars 1 to 45, and the Reports of the Director from 1888 to 1903.

**Experiment Station Work, LXX** (*U. S. Dept. Agr., Farmers' Bul. 504, pp. 24, Ags. 8*).—This number contains articles on the following subjects: Improvement of sandy soils—growth of forage crops, utilization of roughage, fattening lambs on alfalfa and corn, box for feeding alfalfa hay to swine, cooperative herd testing, cooperative cattle breeding, losses due to low-grade cream, lessening danger from poisoning by arsenical dips, and care of farm machinery.

## NOTES.

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**Connecticut Stations.**—Director E. H. Jenkins, of the State Station at New Haven, has been appointed director of the Storrs Station. The board of managers, the funds, and the work of both stations will be separate as in the past, but a single director will administer both stations.

**Delaware College.**—A summer school for teachers, giving instruction in agriculture and home economics, is to be held in 1913, the State Board of Education having recently required the teaching of these subjects in the public schools beginning next fall.

**Kansas College.**—A secondary school of agriculture, mechanic arts, and home economics is to be established next fall to articulate with the eighth grade of the public schools. A three-year course will be offered, with a fourth year for those desiring to enter the college. The present subfreshman course is to be abolished and the entrance requirements raised to 15 units.

**Massachusetts Station.**—H. D. Goodale, a specialist in zoology and since 1911 employed by the Carnegie Institution of Washington in its department of experimental evolution, has been appointed research biologist in the department of poultry husbandry. He will begin his duties February 1, 1913.

**Minnesota University and Station.**—Dr. E. M. Freeman has been appointed assistant dean. G. W. Paterson has succeeded J. B. Lamson as assistant in rural school work. Other appointments include J. H. Allison as professor of forestry, F. A. Cornlea instructor in the school of agriculture, Florence Secor instructor in domestic art, and Charles L. Lewis assistant in drainage investigations. Stephen Anthony has been given leave of absence as chemist in animal nutrition.

**Porto Rico Sugar Producers' Station.**—A meeting was recently held at Fajardo, on the eastern side of the island, for the discussion of irrigation problems. This has been a very dry year and even plantations on the north and east coasts, which usually have sufficient rainfall for sugar cane, have suffered to such an extent that the establishment of irrigation works is being seriously considered. An irrigation engineer of the Department of the Interior was present at the meeting and discussed the engineering features of the problem, and much interest in the subject has been aroused.

**Tennessee University and Station.**—The State Veterinary Medical Association met at the university November 20 and 21 for the first time. The program included a practical demonstration of the vaccination of hogs against cholera. A resolution was passed favoring an appropriation by the State for the establishment of a hog cholera serum plant in connection with the university and station.

A corn exhibit was held November 23, on the station farm, by the boys' corn clubs of eastern Tennessee. There are clubs in 16 of the 34 counties, and the membership numbers about 600. Prizes are awarded valued at \$500, besides local prizes valued at approximately \$3,000 additional.

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